Appendix D Boring Logs Phase I Boring Logs



PROJECT NUMBER:	BORING NUMBER:

339179.RD.FI F

FB-1

SHEET 1 OF 2

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (465021.0 N, 1280122.9 E)

ELEVATION: 151.7 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER				•	START : 8/9/06 14:05 END	: 8/10		08:59 LOGGER : K. Yang
		XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION	Ĭ		COMMENTS
	INTERV	AL (ft)		PENETRATION			3.0	
		RECOVI	RY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		LLIC	DEPTH OF CASING, DRILLING RATE,
		11.200	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	,	SYMBOLLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#111L	(N)	· · · · · · · · · · · · · · · · · · ·		S	
151.7_	1.0				Clay* (CL) Brown, moist, soft to medium stiff, medium plasticity,	_		Down-hole UXO Clearance is performed every 1.5' for top 10', and every 5' until 20'
-	1.0			0.00	gray at top 6"	-		PP = 1.25 - 2.5 tsf
-	0.5	18.0	S1-SS	2-2-2 (4)		_		_
-	2.5					-		PP = 1 tsf;
		16.0	S2-SS	2-2-3 (5)	mottled with 3" thick black sand (organic potential),	_		LL = 27%, PL = 22%, PI = 5%;
-	4.0				bottom 2" silty sand Silt* (ML)		111	Water Content = 19.5% to 28.8%, Organic Content = 3.2%.
5_		17.0	S3-SS	4-3-3 (6)	Brown, moist, medium stiff, low plasticity, trace clay,			PP = 1.5 - 2 tsf
146.7_	5.5				trace sand and mica Silty Sand* (SM)		#	-
-		18.0	S4-SS	4-8-9 (17)	Brown, moist, medium dense to dense, fine grained,			_
-	7.0				possibly weathered rock, mottled black, trace gravel	_		-
-		16.0	S5-SS	5-7-14 (21)		-		-
_	8.5			(21)		_		-
-		14.0	S6-SS	10-20-22	Grayey brown, dense	-	$ \cdot  $	-
10	10.0			(42)	2.2,2, 2.2, 222			
141.7_						-		-
_							$\{[]\}$	- -
-						-		-
								_
_	13.5 13.9	5.0	S7-SS	50/5"	Count's (CVAI)		111	-
-	10.0	5.0	31-33	(50/5")	Sand* (SW) Brown, wet to moist, very dense, fine to medium	-		-
15_					grained, mottled with dark brown, partially weathered			
136.7_					rock	-		-
								_
-						-		-
_								- -
_	18.5 18.9	5.0	S8-SS	50/5"		-		-
		0.0	00 00	(50/5")	trace gravel	_		_
20 <u> </u>								
101.7						-		-
-						_		_
-						-		-
	06 -							_
-	23. <del>5</del>	3.0	\S9-SS <i>)</i>	50/3"	Silty Sand* (SM)		֓֞֟֓֓֓֓֓֓֓֓֓֟֟ ֓֓֓֞֓֓֞֓֓֞֓֓֓֞֓֓֞֓֓֓֞֓֓֡֓֓֓֡֓֡֓֡	-
			(33 33)	(50/3")	Brown, wet, very dense, fine to medium grained			- -
25 <u> </u>							.  }	Grinding sound
] -						_		_
-						-		-
	28.0				Posin Dook Coring at 20 0 ft balances and a section			
-					Begin Rock Coring at 28.0 ft below ground surface See the next sheet for the rock core log	-		-
								_
30								-
		i						



339179.RD.FI FE

FB-1

SHEET 2 OF 2

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (465021.0 N, 1280122.9 E)

ELEVATION: 151.7 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING METHOD AND EQUIPMENT : ATV, CME 55, NQ size double tube core barrel

WATER LEVELS:

START: 8/9/96 14:95

END: 8/10/96 09:59

LOGGER: K. Yang

			.QOII I	MENT : ATV, CIME 35, INQ SIZE double tube core barrer			ORIENTATION: Vertical
WATER	LEVELS :	_		START : 8/9/06 14:05		END: 8/10/06 08:59	LOGGER : K. Yang
≥	<u> </u>			DISCONTINUITIES	SYMBOLLIC LOG	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	ICL	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A BE	돌 두	(%)	돌0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OL	MINERALOGY, TEXTURE,	FLUID LOSS, CORING RATE AND
PT.	A 200	Q D (%)	AC.	PLANARITY, INFILLING MATERIAL AND	MB	WEATHERING, HARDNESS, AND ROCK MASS	SMOOTHNESS, CAVING ROD
몸공	응필문	R O	KH	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	28.0		5	Medium rough, planar, flat to moderately	$\forall$	_ Gneiss*	Greenish water is leaking to _
_				dipping 0 - 45 degree joints from horizontal, no infilling, dark brown stained joint surface	$\gg$	Gray, fine to medium grained, slightly weathered, close spacing, highly	surface;
30 -			3	inililing, dark brown stained joint surface	$\langle \langle \rangle$	weathered at 31.5', hard rock, can not	Coring rates: 3.3, 4, 5, 5, and 4 min/ft from 28' to 33';
121.7	R1-NQ 5 ft	68	2		$\gg$	be broken with 3 firm hits using	Unconfined compressive
_	90%	00		-	$\langle \langle \rangle$	geological hammer	strength = 6600 psi.
-			3	-	$\gg$	-	-
-			1	7	$\langle \langle \rangle$	-	-
	33.0				$\boxtimes$		
-					ŀ	Bottom of Boring at 33.0 ft below ground surface on 8/10/06 08:59	Water is encountered at 8.5' _ during boring; _
35 -				-	ŀ	-	Water is 8' and cave-in is
116.7_							26' at 8/10/2006 08:59 after rock coring;
-				]	ŀ	<del>-</del> -	Water is 6.9' at 8/11/2006
-				-	ŀ	-	13:08.
				]	ı	-	1 ]
_				_	ŀ	_	-
40 -				-	ŀ	-	-
111.7_					Ī	<del></del> -	
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106.7				_	ı	<del></del>	_
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PROJECT NUMBER:	BORING NUMBER

FPS-1

SHEET 1 OF 2

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (465234.6 N, 1279666.1 E)

ELEVATION: 156.8 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	:			START: 8/9/06 09:00 END: 8/	9/06 1	3:10 LOGGER : K. Yang
DEPTH B	BELOW E	KISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION	90	COMMENTS
	INTERVA	RECOVE		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	CONSISTENCT, SOIL STRUCTURE, MIINERALOGT	SYN	INSTRUMENTATION
156.8_	0.0				Concrete*	, S	6" concrete pad
	1.5				Sand* (SW) Brown, moist, loose to medium dense, fine to coarse	-::::	_
	3.0	10.0	S1-SS	3-3-4 (7)	grained, well graded, trace gravel and clay		Down-hole Unexploded Ordinance (UXO) Clearance is made every 1.5' until 9', every 5' thereafter until 20'
	4.5	13.0	S2-SS	8-9-7 (16)		-!:·:	-
5 151.8	6.0	13.0	S3-SS	5-5-4 (9)	Gravelly Sand* (SW) Brown, moist, loose, fine to coarse grained, little gravel, trace clay		
	7.5	14.0	S4-SS	4-6-6 (12)	Silty Sand (SM) Brown, moist to dry, medium dense, fine to medium grained, trace fine gravel and clay		Sand = 49.7%, Fines = 50.3%
	9.0	13.0	S5-SS	5-7-7 (14)	few 1.5" gravel, trace organic fiber		-
10 146.8 - - - -	13.5						Grinding sound from 11' to 13', possibly boulder is encountered
15_ 141.8_ - - - - -	15.0	10.0	S6-SS	9-5-3 (8)	Sand* (SP) Brown, moist to wet, loose to medium dense, fine to medium grained, 1" thick cemented sand, can be broken by finger, trace clay		Chloride = 13 ppm, pH = 5.06 su, Resistivity = 20800 ohm-cm, and Sulfate = 8 ppm
20 136.8	20.0	14.0	S7-SS	2-16-13 (29)	wet, few cemented sand, can be broken by fingers, trace gravel (angular)		- - - - Grinding sound from 21' - 23', possibly
25_ 131.8_ - - - - - - - -	23.2				Begin Rock Coring at 23.2 ft below ground surface See the next sheet for the rock core log		boulder or weathered rock, auger advanced slowly
131.8							



PROJECT NUMBER: **BORING NUMBER:** 339179.RD.FI

FPS-1

SHEET 2 OF 2

#### **ROCK CORE LOG**

LOCATION: (465234.6 N, 1279666.1 E) PROJECT: Washington Aqueduct Residuals Design

ELEVATION: 156.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc. CORING METHOD AND EQUIPMENT: ATV, CME 55, NQ size double tube core barrel ORIENTATION: Vertical WATER LEVELS: START: 8/9/06 09:00 END: 8/9/06 13:10 LOGGER: K. Yang LITHOLOGY DISCONTINUITIES COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) MQ (#) FRACTURES PER FOOT DESCRIPTION SYMBOLLIC ROCK TYPE COLOR DEPTH BELO SURFACE (# SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD MINERALOGY, TEXTURE RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS WEATHERING, HARDNESS, AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS No coring water return; Core barrel dropped 2" - 3" Slightly to medium rough, planar joint, Gneiss\* 3 Gray (23'2" - 24'2"), brown (24'2" discolored joint surface in dark brown, moderately dipping, 20 - 45 degree joints, no 28'2"), fine to medium grained, when it reached 24'2", 6 25 infilling, possible silt seams from 24'2" to 24'5" moderately weathered to highly possibly weak layer or 131.8 R1-NQ and from 27' to 27'2' weathered, very close to close spaced voids: 5 ft 32 5 joints, decomposed to soil at 28', hard Coring rates: 3, 1.5, 2, 2, 92% and 2 min/ft from 23'2" to rock(23'2" - 24'2"), soft rock (24'3" -3 28'2"), can be broken with one slight 28'2" hit using the point of geological 28.2 hammer Medium rough, planar joints, moderately Coring rates: 2, 2, 2, 3, and 5 2 min/ft from 28'2" to 33'2". dipping, 20 - 45 degree from horizontal, thin to Gray, moderately weathered, close joint spacing, decomposed at 32', possible thick soil seams, dark brown stained 4 30 medium soft to hard rock ioint surface 126.8 R2-NQ 5 ft 47 4 83% 2 Driller noticed 6" of easy coring from 32'2" - 32'8", 33.2 possibly soil seams Bottom of Boring at 33.2 ft below ground surface on 8/9/06 13:10 Temporary well was installed: 35 121.8 Water was around 18' durina soil borina: Water is at 15' after coring 8/9/2006 13:10; Water is at 15.3' at 8/11/2006 12:56; 40 Water is at 15' at 9/13/2006 116.8 11:00. 45 111.8 50 106.8



PROJECT NUMBER: BORING NUMBE	PROJECT NUMBER:	BORING NUMBER

339179.RD.FI GCF

GCP-1

SHEET 1 OF 1

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (454468.1 N, 1284871.1 E)

ELEVATION: 139.3 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	S :			START: 8/11/06 13:00	END : 8/1	1/06	14:07 LOGGER : K. Yang
DEPTH E	BELOW E	XISTING C	GRADE (ft)	STANDARD	SOIL DESCRIPTION		90	COMMENTS
	INTERVA	AL (ft)	ERY (in)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSIT	TY OR	SYMBOLLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINER	RALOGY	SYMI	INSTRUMENTATION
139.3_ - -	2.0	14.0	S-1-SS	5-7-8-14 (15)	Silt (ML) Brown, dry, stiff to very stiff, non to low plasticit sand, little clay	ty, some		Topsoil 3"
-	4.0	20.0	S-2-SS	10-11-14-15 (25)		- - -		PP = 4.5+ tsf
5_ 134.3_	6.0	22.0	S-3-SS	6-9-11-14 (20)		-  -		PP = 4.5 + tsf Gravel = 0%, Sand = 30.6%, Silt = 58%, Clay = 11.4%.
-	8.0	22.0	S-4-SS	6-8-10-12 (18)		- - -	-	PP = 4.5+ tsf
10 129.3	10.0	24.0	S-5-SS	7-10-15-17 (25)	Silty Sand* (SM) Reddish brown, dry to moist, medium dense, fi grained	ine -		- - -
129.5_						- - - -		- - -
-	13.5					-		-
15_ 124.3	15.0	14.0	S-6-SS	6-7-12 (19)		-		- -
-						- - -		-
-	18.5					-		- -
20_	20.0	14.0	S-7-SS	35-33-48 (81)	Silty Sand* (SM) Gray, moist to dry, very dense, fine grained	-		-
119.3					Bottom of Boring at 20.0 ft below ground surface 8/11/06 14:07	ce on _ - -		Dry during soil boring;  Water is 16.8' and cave-in is 17.9' at the
-						- - -		completion of boring, 8/11/2006 14:15;  Water is 12.4' and cave-in is 16.8' at
25						- - -		8/14/2006, 07:20.
25_ 114.3_						-		
						- - -		
						- -		
30							$\vdash$	
							_	!



339179.RD.FI G

GCP-2

SHEET 1 OF 2

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (454422.8 N, 1284904.0 E)

ELEVATION: 149.6 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	S:			START: 8/14/06 08:20 END: 8	3/14/0	6 09:45 LOGGER : K. Yang
DEPTH E	BELOW E	XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION	2	COMMENTS
	INTERV	AL (ft)	ERY (in)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	CVMB	INSTRUMENTATION
149.6_	1.0				Gravel* (fill)	-8	Augered 1' gravel on surface _
- - -		15.0	S-1-SS	9-7-8-7 (15)	Silt* (fill) Brown, dry, stiff, low plasticity, top 3" gravel (fill), trace sand and clay		PP = 4.5 tsf
- - -	3.0	12.0	S-2-SS	2-5-4-6 (9)	dry to moist		PP = 1.75 - 2.5 tsf
5 144.6 -	5.0	11.0	S-3-SS	2-3-2-3 (5)	Sandy Clay* (fill) Grayey brown, moist, medium stiff, medium plasticity, trace gravel and silt, little sand		PP = 1.25 - 2.0 tsf;  Water Content = 20.6%.
_	7.0			(5)	uace graver and siit, little sand	$\stackrel{*}{\otimes}$	PP = 0.75 - 1.25 tsf
_	9.0	11.0	S-4-SS	2-2-2-2 (4)	low plasticity	$\frac{1}{2}$	
10_ 139.6_	11.0	14.0	S-5-SS	2-3-3-3 (6)	Gray interval with brown		PP = 0.75 - 2.0 tsf
-							-
- - 15	13.5	18.0	S-6-SS	7-11-13 (24)	Silt* (ML) Brown, dry, very stiff, low plasticity, trace clay, sand, and gravel	-X	PP = 4.0 - 4.5+ tsf
134.6_ - - - - -	18.5				and graves		- - - - - - -
20	20.0	17.0	S-7-SS	9-11-14 (25)	Sandy Silt (ML) Reddish brown, dry to moist, very stiff, non plasticity, trace a few pieces of rock fragments up to 1".	-	Gravel = 0.9%, Sand = 38.3%, Fines = 60.8%, Water Content = 21.4%.
129.6_ - - - -	23.5					-	- - - - -
25_ 124.6	25.0	14.0	S-8-SS	8-11-13 (24)	Mottled with dark brown		
- - -	00.5					-	
30	30.0	14.0	S-9-SS	12-13-13 (26)	Gray brown mottled with black, wet		=
	-						



339179.RD.FI GCP-2

SHEET 2 OF 2

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (454422.8 N, 1284904.0 E)

ELEVATION: 149.6 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER					START: 8/14/06 08:20	END : 8/14	/06 (	09:45 LOGGER : K. Yang
DEPTH I	BELOW E	XISTING C	RADE (ft)		SOIL DESCRIPTION		90	COMMENTS
	INTERV	AL (ft)	ERY (in) #TYPE	PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, C MOISTURE CONTENT, RELATIVE DENS CONSISTENCY, SOIL STRUCTURE, MINE	OLOR, HTY OR RALOGY	SYMBOLLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
119.6_ - - - - - - 35_ 114.6_ -	<u>33.</u> 5	3.0	<u>§-10-S</u> Ş		Silty Sand* (SM) Grayey brown, wet, very dense, trace rock fra partially weathered rock	gments,		_
40 109.6_ 109.6_ 	38.5	1.5	<u>6-11-S</u> \$	50/1.5" (50/1.5")	Gravel* (SP) Gray, wet, very dense, angular, coarse Bottom of Boring at 38.6 ft below ground surfa 8/14/06 09:45	ace on		Water is encountered at 27.9' during soil boring;  Auger Refusal at 38.6';  The hole is grouted using cement - water - bentonite grout right after the completion of boring.
60_						<del>-</del>	_	



PROJECT NUMBER: BORING NUMBER
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339179.RD.FI GCP-3

#### **SOIL BORING LOG**

SHEET 1 OF 1

PROJECT : Washington Aqueduct Residuals Design LOCATION : (454719.1 N, 1285171.7 E)

ELEVATION: 136.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	S :			START: 8/14/06 07:25	ND : 8/14	/06 (	08:00 LOGGER : K. Yang
			GRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS
	INTERV	AL (ft)		PENETRATION TEST RESULTS			CLC	
		RECOVE	ERY (in)	LOT NEGOLIG	SOIL NAME, USCS GROUP SYMBOL, COLOR MOISTURE CONTENT, RELATIVE DENSITY O		)LLI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALO	OGY	SYMBOLLIC LOG	INSTRUMENTATION
100 1				(N)			Ś	
136.1_	0.0			4-9-10-8	Silt* (ML) Brown, dry, stiff to very stiff, non plasticity	-		3" Topsoil with grass roots
1 1		20.0	S-1-SS	(19)	Brown, dry, dun to very dun, from pladuoity			
1 -	2.0					_		PP = 4.5+ tsf
		18.0	S-2-SS	6-6-8-12				11 - 4.51 (5)
-	4.0	10.0	3-2-33	(14)		_		
1 +	4.0				Sandy Silt* (ML)		₩	PP = 4.5+ tsf
5_ <sup>-</sup> 131.1		20.0	S-3-SS	11-17-16-14	Brown, dry, hard, non plasticity, little sand			Chloride = 9 ppm, pH = 4.64 su, Resistivity =
131.1	6.0			(33)		-		9700 ohm-cm, and Sulfate = 25 ppm.
				0.40.40.45	Clayey Silt* (ML)		$\parallel \parallel$	
-		21.0	S-4-SS	6-10-13-15 (23)	Grayey brown, dry, very stiff, low plasticity, little cla	ay _		
1 1	8.0			(20)				
1 -				7-8-9-11		-		PP = 4.0 - 1.5 tsf decrease with depth
		24.0	S-5-SS	(17)	Silty Clay* (CL)		///	decrease with depth
10 <u></u> 126.1	10.0				Grayey brown, moist, very stiff, low plasticity			_
120.1						-		•
1 ]						1		
1 -						-		
1 +	13.5				Clayey Silt* (ML)	_	///	PP = 4.0 - 4.5+ tsf
1 1		21.0	S-6-SS	6-9-15 (24)	Grayey brown, dry to moist, very stiff, low plasticity	·		11 - 4.0 - 4.5 (8)
15 <u>1</u>	15.0			(24)				_
'2'.'-						-		
1 ]						1		
1 -						-		
]	10.5					1		
+	18.5			400	Clayey Sand* (SC)		]]] ]///	PP = 0.75 - 3.25 tsf
	00.5	13.0	S-7-SS	4-9-8 (17)	Grayey brown, moist, medium dense, few clay, trac	ce 🗍		
20_ 116.1	20.0			· · /	gravel  Bottom of Boring at 20.0 ft below ground surface or	n	<u> </u>	No water is encountered during boring;
					8/14/06 08:00	1		
-						-		Dry and 17'5" cave- in at 8/14/2006 08:25, i.e. end of boring;
]								
-								water is 6'10" and cave-in is 13'3" at 8/15/2006 08:05.
						-		3/13/2000 00.00.
]						4		
25 <u> </u>								_
]						1		
						+		
1 1						1		
1 -						-		
						-		
20						1		
30								



PROJECT NUMBER: 339179.RD.FI BORING NUMBER: GCP-4

SHEET 1 OF 2

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (454677.9 N, 1285202.4 E)

ELEVATION: 149.1 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER					START : 8/14/06 12:00	END : 8/14		14:35 LOGGER : K. Yang
		XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION	2112 : 0/11		COMMENTS
	INTERV		, ,	PENETRATION			LOG	
		RECOVE	ERV (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLO		LIC	DEPTH OF CASING, DRILLING RATE,
		KLOOVI	#TYPE	6"-6"-6" (N)	MOISTURE CONTENT, RELATIVE DENSITY CONSISTENCY, SOIL STRUCTURE, MINERAL		SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
149.1_	1.0			(14)	Gravel* (fill) Gray	-	$\bigotimes$	Augered 1' at the top of roadway/dike An electric line (3-1/4 diameter) is around 1.5'
- - -	3.0	14.0	S-1SS	5-8-5-5 (13)	Silt And Sand (fill) Brown, dry, stiff, trace gravel	-		away from the boring.
5	5.0	14.0	S-2SS	3-4-4-3 (8)	moist, loose, little clay	-		PP = 1 - 2.5 tsf Sand=40.1%, silt=41.5%, and clay=18.3%
144.1_	7.0	13.0	S-3SS	2-3-3-3 (6)		-		PP = 4 - 1.25 tsf decrease with depth
- - -	9.0	19.0	SB-1ST		Sandy Clay* (fill) Brown and Grayey Brown, moist, soft, medium pl	asticity _ -		PP = 0.5 tsf at the bottom of shelby tube
10_ 139.1_	11.0	14.0	S-5SS	1-2-2-1 (4)	Grayey Brown, moist, soft, medium plasticity, trac gravel, soft interval with medium stiff possibly due inconsistent compaction or no compaction			PP = 0.375 - 1.25 tsf
- - - - - 15	13.5 15.0	13.0	S-6SS	1-2-3 (5)	Brown, moist, soft to medium stiff, low to medium plasticity	- - - -		PP = 0 - 1.25 tsf a thin (1" - 2") soft layer with PP = 0 - 0.25 tsf
134.1_ - - - - -	18.5					-		at depth of 14.5'
20 129.1_	20.0	17.0	S-7SS	6-9-13 (22)	Silty Clay* (CL) Gray, moist to dry, very stiff, medium plasticity	- - -		PP = 3.5 - 4.5+ tsf
-	23.5					- - - -		
25_ 124.1	25.0	18.0	S-8SS	4-6-6 (12)	medium plasticity, stiff to soft (bottom of sample)	-		PP = 4.0 - 0.5 tsf decrease with depth
-	28.5	18.0	S-9SS	7-9-12	Sandy Clay* (CL) Gray, dry to moist, very stiff, medium plasticity, tra	- - - - - - ace		PP = 3.0 - 4.5 tsf
30	30.0			(21)	gravel and mica			



PROJECT NUMBER:	BORING NUMBER:

GCP-4

SHEET 2 OF 2

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454677.9 N, 1285202.4 E)

ELEVATION: 149.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER LEVELS :					START : 8/14/06 12:00 END : 8/14/			06 14:35 LOGGER : K. Yang		
DEPTH BELOW EXISTING GRADE (ft) STANDARD				STANDARD	STANDARD SOIL DESCRIPTION			COMMENTS		
	INTERV	AL (ft)	ERY (in) #TYPE	PENETRATION TEST RESULTS 6"-6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COI MOISTURE CONTENT, RELATIVE DENSIT CONSISTENCY, SOIL STRUCTURE, MINERA	LOR, Y OR ALOGY	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION		
119.1 - - - - - - - - - - - - - - - - - - -	33.5 35.0	16.0	S-10SS	5-50/5.5" (50/5.5")	Silty Sand* (SM) Brown mottled with Dark Brown, wet, very dens grained, partially weathered micaceous rock	e, fine				
40 109.1	38.5 38.7	2.5	<u>S-11SS</u>	50/2.5" (50/2.5")				bouncing of sampling rod		
45 104.1	<del>43.</del> 5	3.0	<u>S-12SS</u>	50/3" (50/3")	trace gravel			grinding sound of steel on hard material, possibly weathered rock fragments		
50 99.1	48.5	14.0	S-13SS	46-45-36 (81)	trace gravel  Bottom of Boring at 50.0 ft below ground surfac 8/14/06 14:35	e on _		Water is encountered at 30' during boring;		
- - - - - - 55 94.1					0/14/00 14.33	-		the hole is grouted using cement - water - bentonite grout right after boring; water is 40' at 8/14/2006 14:35, i.e. end of rock coring.		
- - - - - -										
60										



PROJECT NUMBER:	BORING NUMBER:

GPS-1

SHEET 1 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (454255.6 N, 1284854.1 E)

ELEVATION: 145.1 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER LEVELS : DEPTH BELOW EXISTING GRADE (ft)					START: 8/10/06 11:10 END:	: 8/10/	06 1	15:34 LOGGER : K. Yang
DEPTH E	BELOW E	XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION		90	COMMENTS
	INTERV	AL (ft)	ERY (in)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYME	INSTRUMENTATION
145.1_ - -	2.0	20.0	S-1-SS	9-38-16-9 (54)	Silty Gravel* (fill) White/brown, dry, very dense, subangular	_ _ _	$\overset{\otimes}{\otimes}$	2" topsoil
-	4.0	20.0	S-2-SS	2-5-4-5 (9)	Clayey Gravel* (fill) Brown, dry, loose, subrounded			
5 140.1	6.0	18.0	S-3-SS	3-3-5-9 (8)	Clay* (possible Fill) (CL) Reddish brown, dry, medium stiff, low to medium plasticity, little gravel			PP = 2.0 - 3.0 tsf grinding sound
-	8.0	20.0	S-4-SS	3-4-6-7 (10)	Silty Clay* (possible Fill) (CL) Brown, dry to moist, stiff, low to medium plasticity			PP = 1.5 - 2.75 tsf
10	10.0	20.0	S-5-SS	9-10-10-13 (20)	Clayey Silt* (ML) Brown, dry, very stiff, low plasticity	-		PP = 3.25 - 4.25 tsf
135.1_ - - - -	13.0					-		PP = 2.5 - 4.5+ tsf
15	14.5	18.0	S-6-SS	4-7-11 (18)	Brown mottled dark brown, few gravel			
130.1_ - - -						- - - -		
- - -	18.0	15.0	S-7-SS	3-6-8 (14)	Sandy Silt* (ML) Brown, moist, stiff to very stiff, low plasticity			
20 125.1_ - - -						-		
25	23.0	17.0	S-8-SS	10-10-9 (19)		-		
120.1 - -								
30	28.0	14.0	S-9-SS	23-34-50/4" (84/10")	Silty Sand (SM) Grayey brown, wet, very dense, fine grained, partially weathered rock		1111	Sand = 68.1%, Fines = 31.9%.
30							HI.	



PROJECT NUMBER: BORING NUMBER
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GPS-1

SHEET 2 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454255.6 N, 1284854.1 E)

ELEVATION: 145.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER LEVELS :					START: 8/10/06 11:10	//06 15:34 LOGGER : K. Yang			
DEPTH BELOW EXISTING GRADE (ft)  INTERVAL (ft)  STANDARD PENETRATION TEST RESULTS					SOIL DESCRIPTION		90.	COMMENTS	
11	NTERVA	AL (ft) RECOVE	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSIT CONSISTENCY, SOIL STRUCTURE, MINER	LOR, IY OR ALOGY	SYMBOLLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
11-1				6"-6"-6" (N)			Š		
	33.0 33.9	11.0	S-10-SS	22-50/4.5" (50/4.5")	mottled with dark brown			_	
40_105.1	38.0 38.5	0.0	6-11-SŞ	50/1" \ (50/1")	No Recovery  Begin Rock Coring at 38.5 ft below ground surf See the next sheet for the rock core log			Rod is bouncing when sampling \Auger Refusal at 38.5'	
45						1			
100.1								-	
50 <sup>-</sup> 95.1 <sub>-</sub> - - - -						-		_	
55 90.1						-		_	
60						-			



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SHEET 3 OF 3

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (454255.6 N, 1284854.1 E)

ELEVATION: 145.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING METHOD AND EQUIPMENT : ATV, CME 55, NQ size double tube core barrel ORIENTATION : Vertical

DISCONTINUITIES  DISCONTINUITIES  DESCRIPTION  DESCRIPTIO	on surface
DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  AND ROCK MASS CHARACTERISTICS  Gray, fine to medium grained, slightly Weathered, close to mediant grained, slightly Weathered, close	D DEPTH OF CASING, SS, CORING RATE AND HNESS, CAVING ROD TEST RESULTS, ETC.  on surface  al joints at 40.6',
DESCRIPTION  ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND CHARACTERISTICS  PLANARITY, INFILLING MATERIAL AND CHARACTERISTICS  Medium rough, planar, flat to gently dipping, 0 - 15 degree from horizontal points follows and points follows to medium grained, slightly water loss of water loss o	ss, coring rate and inless, caving rob test results, etc. on surface
38.5  Medium rough, planar, flat to gently dipping, 0 - 15 degree from horizontal joints, some dark  brown stained injet surface, no infilling  Medium rough, planar, flat to gently dipping, 0 Gray, fine to medium grained, slightly water loss of the planar flat to gently dipping, 0  Water loss of the planar flat to gently dipping, 0  Gray, fine to medium grained, slightly water loss of the planar flat to gently dipping, 0  Horizontal planar flat to gently dipping, 0	on surface
R-1-NQ spacing, hard rock (need more than 1 firm geological hammer blow)  Red-note than 1 firm geological hammer blow)  Mechanica 43.7' and 4 Coring rate	es: 4.7, 4.3, 4.8,
45_100.1 R-2-NQ 5 ft 100% 95 2 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	es: 5.4, 5.0, 5.5, .7 min/ft from
48.5  Bottom of Boring at 48.5 ft below ground surface on 8/10/06 15:34  Water is end during boring at 48.5 ft below ground surface on 8/10/06 15:34  Water is 15 22.5 at 8/1 after rock of Water is 20 Water is 2	5.5' and cave-in is 10/2006 15:34



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SHEET 1 OF 3

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454280.6 N, 1284833.2 E)

ELEVATION: 141.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	S :			START: 8/11/06 07:30	END : 8/1	1/06	12:15 LOGGER : K. Yang
			GRADE (ft)	STANDARD	SOIL DESCRIPTION	E110 : 0/1		COMMENTS
[	INTERVAL (ft)  RECOVERY (in)			PENETRATION		SYMBOLLIC LOG		
				TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COL			DEPTH OF CASING, DRILLING RATE,
		RECOVE	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY CONSISTENCY, SOIL STRUCTURE, MINERA		/BO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#ITPE	(N)			S	
141.9_	0.0				Clayey Gravel* (fill)		-	3" topsoil
-		16.0	S1-SS	35-17-10-12 (27)	Gray, dry, medium dense		-₩	-
-	2.0			(21)			₩	·
1 7				07.00.0.4			$\rightarrow\!$	
-		17.0	S2-SS	27-20-3-4 (23)			-	<del>-</del>
1 1	4.0			(==)	Clay* (fill)			
5 -				2-1-2-1	Brown, dry, medium stiff, medium plasticity Sandy Clay* (possible Fill) (CL)	/		PP = 1 - 1.5 tsf
136.9		15.0	S3-SS	(3)	Brown, moist, soft to medium stiff, low plasticity,	trace _		-
1 +	6.0				gravel			A Challey Tyles commission taken from Class Cl.
-		17.0	CD4 OT				1///	A Shelby Tube sample is taken from 6' to 8'; Triaxial CU test provided: c' = 258 psf,
1		17.0	SB1-ST				1///	effective friction angle = 26.5 degree.
+	8.0		-				-{///	undrained shear strength Su = 930 psf at confining pressure of 1 ksf, and Su = 1312 psf
1		15.0	S5-SS	2-3-3-3			<b>1</b> ///	at confining pressure of 2 ksf.
10	10.0	13.0	00.00	(6)			<b>¥</b> ///	PP = 0.5 - 1.0 tsf; LL = 38%, PL = 18%, PI = 20%, Water
131.9	10.0					_		content = 21.1%.
-								<del>-</del>
-	13.5							-
1 🖠	10.0			4-7-7	Silty Sand* (SM)			
15	15.0	17.0	S6-SS	(14)	Reddish brown to grayey brown, moist, medium		<b>-</b>	-
126.9	15.0			` '	to dense, fine grained, micaceous decomposed	TOCK _	1::::::::::::::::::::::::::::::::::::::	] -
							<b>]</b>   }	
-							<b>-</b> [[[]	-
							<b>1</b>	
-	18.5							]
l	10.0			10-16-21			<b>]</b>    [	
20 -	20.0	16.0	S7-SS	(37)			<b>-</b>    [	
121.9	20.0					_	<b>-</b>	-
]							]  :	
-							<b>- </b>	
							<b>]</b>	]
-	23.5						<b>- </b>	-
+	23.3			9-10-14			<b>]</b>	1
\	25.0	15.0	S8-SS	9-10-14 (24)			411	
25_ 116.9	25.0			. ,		_	1	-
]							]  [	
-							<b>-</b>	·
							1  }	]
-	28.5						4  }	-
]	20.0			11-14-24			<u> </u>	]
30	30.0	15.0	S9-SS	(38)	wet		<b>-[</b> ]][	-
30	30.0						1111	-



PROJECT NUMBER: BORING NUMBER
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SHEET 2 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454280.6 N, 1284833.2 E)

ELEVATION: 141.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER LEVELS :					START : 8/11/06 07:30	END : 8/11		
DEPTH BELOW EXISTING GRADE (ft)  INTERVAL (ft)  STANDARD PENETRATION TEST RESULTS					SOIL DESCRIPTION			COMMENTS
	INTERVAL (ft)					OT O		
		RECOV	ERY (in)	LOT RESOLTS	SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSIT	LOR,	JLL	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINER	ALOGY	SYMBOLLIC LOG	INSTRUMENTATION
111.9_						_		
-				-	Silty Sand* (SM)			
-					Grayey brown, wet, fine grained	-		
_						-		
_	33.5			25-50/5.5"		_		
_	34.4	10.0	S10-SS	(50/5.5")	very dense, partially weathered rock	-		1
35 <u> </u>								-
100.5_						-		
_						_		1
-						-		1
] -	39 5					-	<b>!</b>   }	
_	38.5 38.8	3.0	S11-SS	50/3"		-		:
40				(50/3")		-	<b> </b>	
40 <u> </u>								-
_						_		:
_	42.0					-		
_					Begin Rock Coring at 42.0 ft below ground surf See the next sheet for the rock core log	face _		
_					See the next sheet for the rock core log	-		
_						_		
45						-		
96.9						_	1	-
-						-		
_						_		
_						-		
_						-		
-						-	•	
50						_		_
91.9						-	l	
_						-	1	
-						-	l	
						_	1	
_						-	l	
_						-	1	
55 86.9						_	l	-
55.5 -						-	1	
-						-		
-						-	l	
_						_	1	
-						-	l	
						-	1	
60							$\vdash$	
								Į.



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SHEET 3 OF 3

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (454280.6 N, 1284833.2 E)

ELEVATION: 141.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING METHOD AND EQUIPMENT : ATV, CME 55, NQ size double tube core barrel ORIENTATION : Vertical

	J WIL II IOD /	114D L	.QUII I	MENT : ATV, CME 55, NQ size double tube core barre			ORIENTATION : Vertical
WATER	R LEVELS :	-		START: 8/11/06 07	:30	END: 8/11/06 12:15	LOGGER : K. Yang
>	(9)			DISCONTINUITIES	ЭG	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
45 96.9 -	42.0 R1-NQ 5 ft 100% 47.0 R2-NQ 5 ft 100%	42	2 4 5 6 4 3 2 5 3	Medium rough, planar, flat to moderately dipping, 0 - 45 degree from horizontal, reddish brown stained joint surface, no infilling, possibly 3 sets of joints, 0, 45, -45 degree orientation,		Gneiss* Gray, fine to medium grained, slightly weathered, very close to close joint spacing, decomposed at 45', hard rock  slightly weathered to unweathered	Gray color water is leaking on surface; Coring rates: 5.8, 5.1, 7, 5.1, and 6.6 min/ft from 42' to 47'; Unconfined compressive strength = 4450 psi. Water loss in borehole when core barrel is 45';  Coring rates: 4.6, 5.8, 5.8, 5.5, and 6 min/ft from 47' to 52'.
55 86.9 60 81.9 65 76.9	52.0					Bottom of Boring at 52.0 ft below ground surface on 8/11/06 12:15	Water is encountered at 27.6' during boring;  A temporary well was installed;  Water is 20' after rock coring at 8/11/2006 12:22;  Water is 20.4' at 8/15/2006 8:07;  Water is 20.3' at 8/18/2006 14:20;  Water is 19.5' at 9/13/2006 11:45.



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SHEET 1 OF 3

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (462250.0 N, 1280081.5 E)

ELEVATION: 145.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER					START : 8/15/06 09:30 END :			13:08 LOGGER : K. Yang	
			GRADE (ft)	STANDARD	SOIL DESCRIPTION	Í		COMMENTS	
	INTERV	AL (ft)	PENETRATION TEST RESULTS			CLC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND		
	RECOVERY (in)			TEOT REGGETO	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR				
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLLIC LOG	INSTRUMENTATION	
145.8_	1.0				Silty Sand* (fill) Brown, dry, medium dense, fine grained, trace gavel	-	$\bigotimes$	Augered 1' to avoid surface gravel	_
	3.0	19.0	S1-SS	8-12-15-19 (27)		- - -	$\overset{\otimes}{\otimes}$	Grinding sound, possibly cobbles/boulders	-
5	5.0	10.0	S2-SS	10-11-8-8 (19)		- - -	$\overset{\times}{\times}$		-
140.8_	7.0	16.0	S3-SS	5-4-11-8 (15)	Sandy Clay* (fill) Brown, dry, stiff, low plasticity, trace gravel, bottom 4" sandy gravel			PP = 2 - 3 tsf Chloride = 11 ppm, pH = 7.3 su, Resistivity = 7120 ohm-cm, Sulfate = 14 ppm.	-
	9.0	13.0	S4-SS	4-5-7-6 (12)	Silty Sand* (fill) Brown, dry, medium dense, fine grained, trace gravel				-
10_ 135.8_	11.0	11.0	S5-SS	3-3-4-5 (7)	Sandy Clay* (fill) Brown, dry to moist, medium stiff, low plasticity, trace gravel and black organic fiber			PP = 1 - 1.5 tsf; Water Content = 19.1%; Organic Content = 1%.	-
-						- - - -			-
15_	13.5	10.0	S6-SS	4-8-6 (14)	Silty Sand* (possible Fill) (SM) Grayey brown, dry to moist, loose to medium dense, fine grained, few gravel up to 1" size				-
130.8_						- : - : - :		Grinding sound, possibly cobbles	-
	18.5			3-3-3					-
20_ <sup>-</sup> 125.8_	20.0	11.0	S7-SS	(6)	moist, loose				_ _
									-
-	23.5			0.40.46		=			-
25_ 120.8	25.0	14.0	S8-SS	9-10-16 (26)	moist, medium dense, no gravel	-			_
-						- -  -  -			-
	28.5					- - -			-
30	30.0	13.0	S9-SS	20-24-28 (52)	Silty Sand* (SM) Grayey brown, moist, very dense, fine grained				_



PROJECT NUMBER:	ORING NUMBER:

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SHEET 2 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (462250.0 N, 1280081.5 E)

ELEVATION: 145.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

DEPTH SELOW EXISTING GRADE IT STANDARD NEED THE PROPERTY OF TH	WATER LEVELS :					START: 8/15/06 09:30	END : 8/15	/06 1	
38.6	I -			GRADE (ft)	STANDARD	SOIL DESCRIPTION		90	COMMENTS
33.6		INTERVA				SOIL NAME, USCS GROUP SYMBOL, C MOISTURE CONTENT, RELATIVE DENS CONSISTENCY, SOIL STRUCTURE, MINE	OLOR, BITY OR ERALOGY	SYMBOLLIC L	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
38.6 34.1 1.5 810.SS 50/1.5" (S0/1.5") (S0/1.5	115.8				(. 1)				Grinding sound, rock fragments
	35 110.8 1 100.8 1 100.8 1 1 100.8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	33.5 34.1	1.5	\$10-S\$	50/1.5" \ (50/1.5")	Gray, dry, very dense, possibly weathered ro Begin Rock Coring at 34.1 ft below ground so	- - - -		



PROJECT NUMBER: BORING NUMBER: 339179.RD.FI

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SHEET 3 OF 3

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (462250.0 N, 1280081.5 E)

ELEVATION: 145.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING METHOD AND EQUIPMENT: ATV. CME 55, NQ size double tube core barrel ORIENTATION · Vertical

DETH. TYPE. ORIENTATION, ROUGHNESS. PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS  35 110.8 R1-NQ 5 ft 100%  R2-NQ 5 ft 100.8 R2	CORING METHOD A	ORIENTATION : Vertical					
DESCRIPTION  DEPTH. TYPE. GRIENTATION, ROUGHNESS, SUPPLANT, PRILLIAN, MAN FERMAL AND  ST. PLANARTY, PRILLIAN, MAN FERMAL AND	WATER LEVELS :			START : 8/15/06 09	:30	END: 8/15/06 13:08	LOGGER : K. Yang
35. 110.8   34.1   2   2   2   2   2   2   39.1   3	> 6			DISCONTINUITIES	ЭG	LITHOLOGY	COMMENTS
35. 110.8 R1-NO	DEPTH BELOW SURFACE (ff) CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLLIC LO	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
medium rough bedding or joints, moderately dipping (+/- 45 degree), generally thin to medium bedding, very close to close joint spacing, generally narrow separation, wide to very wide separation from 42.5 to 42.8°. Possible 5" of decomposed rock pieces from 42.5" to 42.9°. Possible 5" of decomposed rock pieces from 42.5° to 42.9°. Possible 5" of decomposed rock pieces from 42.5° to 42.9°. Po	35_ 110.8_ - - - - - - - - - - - 5 ft	90	1 2	surface, flat to moderately dipping (0, +45 - 45 degree), very narrow to tide, stained, infilling in		Gray, fine to medium grained, slightly weathered to fresh, mottled with brown from 34.1' to 36', medium bedding, close joint spacing, medium soft to	Water lost on surface when core barrel is at 36'; Coring rates: 5.6, 4.3, 4.5, 5, and 5.8 min/ft from 34.1'
## Bottom of Boring at 44.1 ft below ground surface on 8/15/06 13:08  ## Bottom of Boring at 44.1 ft below ground surface on 8/15/06 13:08  ## Water is 11'8" and caveing at 8/15/2006 13 after rock coring;  ## Water is 20'4" at 8/18/20  ## Bottom of Boring at 44.1 ft below before rock coring;  Water is 11'8" and caveing at 8/15/2006 13 after rock coring;  ## Water is 20'4" at 8/18/20  ## Parameters of the state of the	40 105.8 R2-NQ 5 ft 92%		0 5 3 >10	dipping (+/- 45 degree), generally thin to medium bedding, very close to close joint spacing, generally narrow separation, wide to very wide separation from 42.5' to 43.5', some		<ul> <li>weathered to moderately weathered,</li> <li>decomposed rock pieces from 42.5' to</li> <li>42.8'. Possible 5" of decomposed rock infilling is washed out by water at</li> </ul>	Unusual noise came out from coring at 39.5'. Noise is gone after 1 min; Coring rates: 4, 5.6, 4.6, 4.5, and 5 min/ft from 39.1'
	45						before rock coring;  Water is 11'8" and cave-in is 31'10" at 8/15/2006 13:05 after rock coring;  Water is 20'4" at 8/18/2006
						-	_

Phase II Boring Logs



339179.RD.FI BH-01

SHEET 1 OF 3

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (462997.4 N, 1281387.5 E)

ELEVATION: 218.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

DRILLING EQUIPMENT AND METHOD: Truck Mounted. CME 55. 2-1/4" ID HSA. 140 lb hammer with cathead. 2" OD Split Spoon

					inted, CME 55, 2-1/4" ID HSA, 140 lb hammer with cathe			
			below gr GRADE (ft)	ound surface	START : 3/12/07 07:45 EN SOIL DESCRIPTION	D : 3/12		15:30 LOGGER : L. Seraydarian COMMENTS
<i>D</i>	INTERV		), U.D.E (II)	STANDARD PENETRATION	0012 22001.11 11011		SYMBOLIC LOG	
		RECOVE	FRY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		CIC	DEPTH OF CASING, DRILLING RATE,
		I TALLOOVA	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOG		MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#1111 E	(N)	,		SY	
218.8_	0.0 1.0	8.0	S1SS	2-3	Top Soil* brown, dry, grass, roots, (fill)	-	7/ 1/X	PP=1 tsf
_		1.0	S2SS	4-4	Silt* (ML)			
_	2.0	6.0	S3SS	3-5	brown, dry, medium stiff, nonplastic, (fill)		XX	PP=0.5 tsf
_	3.0	5.0	S4SS	8-12	trace sand		$\bowtie$	PID=0 PP=1.5 tsf
-	4.0	1.0	S5SS	10-7		-	$\bowtie$	PID=0
5 213.8	5.0				estimated 5% clays & 5% coarse sand	-	$\bowtie$	PP=1.25 tsf
_	6.0	9.0	S6SS	5-8	Elastic Silt (MH)		$\bowtie$	PP=1.5 tsf
_	7.0	12.0	S7SS	14-19	brown, dry, very stiff, low plasticity, little coarse sand asphalt chips, few gravel up to 0.5 in diameter, trace	, [	$\bowtie$	PID=0
_	8.0	6.0	S8SS	12-11	clay (fill)		$\bowtie$	Gravel = 10.7%, Sand = 24.9%, fines = 64.4 %
_	9.0	4.0	S9SS	9-13	Fine Sand W/ Mica* (SP) brown, dry, loose, (fill)	-	$\bowtie$	
10		12.0	S10SS	7-6-7	Silt W/fine Sand* (ML) brown, moist, stiff, slightly plasticity, 5% clay (fill)	-	$\bowtie$	
208.8	10.5			(13)	,,,g, p,,	7	$\bowtie$	Note: Split spoon was sampled every 1 ft for
_						1	$\bowtie$	top 10 ft due to Unexploded Ordnance (UXO)
-							$\bowtie$	check. UXO check was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft.
_	12.5					1	$\bowtie$	No UXO interference was detected. No elevated Photo Ionisation Detector (PID)
_	13.5			3-4-6	Sand W/ Silt* (SP-SM)		$\overleftrightarrow{\otimes}$	readings.
15	15.0	6.0	S11SS	(10)	light brown, moist, loose, estimated 10% silt (fill)		XX	
203.8						7	$\bowtie$	
_							$\bowtie$	
_						-	$\bowtie$	
_	40.5					1	$\bowtie$	
_	18.5			31-37-31	Poorly Graded Sand* (SP)		XXX	
20	20.0	15.0	S12SS	(68)	light brown, dry, very dense, fine to medium grained estimated 5% silt, 15% coarse sand	, ]		
198.8	20.0				estimated 670 siit, 1670 source suita			
-						-		
_						4		
_						_		
_	23.5				Well Graded Sand* (SW)			
		12.0	S13SS	7-20-26 (46)	light brown, dry, dense, trace silt			
25_ 193.8	25.0			(10)		_		
						1		
-							:::	
_						4		
_	28.6		04:55					
_		0.0	\ <u>S14SS</u> /	50/1 (50/1")	No recovery, partially weathered rock	-	::	
30				1			***	
	ı	i .	I	i				



PROJECT NUMBER: BORING NUMBER
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BH-01

SHEET 2 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (462997.4 N, 1281387.5 E)

ELEVATION: 218.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	unted, CME 55, 2-1/4" ID HSA, 140 Ib nammer with START : 3/12/07 07:45	END : 3/12			
		XISTING (			SOIL DESCRIPTION	LIVD . 0/ 12		COMMENTS	_
1 .	INTERV		. 7	STANDARD PENETRATION TEST RESULTS			SYMBOLIC LOG		_
		RECOVE	ERV (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSI	DLOR,	CIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
		I NECOVI	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSI CONSISTENCY, SOIL STRUCTURE, MINEI	I Y OR RALOGY	MBO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
			#ITPE	(N)	, WINVE		SYI		
188.8_					Well Graded Sand* (SW)		***		_
_					light brown, dry, dense, trace silt, partially wearock	athered _			-
					TOOK	_	***	1	
						_	***	;	-
-	33.5					-			-
1 ]	00.0	1.0	\S15SS/	50/1		_			
35				(50/1")		-	· · · ·	1	-
35 <u> </u>								1	_
-						-		1	-
						-	۶۰۰۰	1	-
]						1	۶۰۰۰	1	
-	38. <del>5</del>					-	٤٠٠٠	1	-
1 1	38:7	2.0	S16SS	50/2	Micaceous Silty Sand (SM)	_	ŤĚ	water was encountered at 38' bgs	-
40				(50/2")	gray brown, damp, very dense, fine to mediun sand	n grained _	$  \cdot  \cdot  $	Auger refusal at 41 ft bgs 41' auger refusal	-
178.8					our IV			. Tauger rerusar	_
1 ]	41.0				Davis Davis Carina of 44.0 GU		111		_
1 +					Begin Rock Coring at 41.0 ft below ground su See the next sheet for the rock core log	nace _			-
					ess are nower serior are room sore rog				_
-						-			-
						_			-
45						_			_
173.8									_
									_
-						-			-
						_			-
-						-			-
						-			-
50						]			
168.8									_
1 ]									
-						-			-
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-						-			-
[ ]						4			
55 <u></u> 163.8									_
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ldot		<u> </u>							



PROJECT NUMBER: BORING NUMBER: 339179.RD.FI

**BH-01** 

SHEET 3 OF 3

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (462997.4 N, 1281387.5 E)

ELEVATION: 218.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD: Truck Mounted, CME 55, NQ size double tube core barrel ORIENTATION · Vertical

CORING	ORIENTATION : Vertical						
WATER	LEVELS : 32	2.0 ft l	pelow	ground surface START : 3/12/07 07	':45	END: 3/12/07 15:30	LOGGER : L. Seraydarian
>	(9)			DISCONTINUITIES	ي [	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
	41.0	_	2	Fractures, 10 deg and 60 deg, medium rough,	W	_ Gneiss*	Rock coring rates (min/ft):
-			3	clay infilling, brown, joint color is rust brown, no voids,solid clay infilling at 44.8' tight narrow		gray, medium soft, coarse sand to medium sand, slightly weathered,	4/3/3/3/2.8 Unconfined compressive
-	R1NQ 4.5 ft	78	1		$\mathbb{M}$	black mica, plagioclage feldspar, quartz	strength (UCS) = 5203 psi
-	100%		2		₩	- -	-
45 <u> </u>	45.5		1	-	$\mathbb{M}$	 -	_
-			2	Fractures, 10 deg and 65 deg, slight to medium rough, clay infilling, at 46.5' bgs tight		hard, coarse sand, slightly weathered, close joint spacing	Rock coring rates (min/ft): _ 3.3/3.1/3.2/4.1
-	R2NQ		3	narrow, rust brown to black color in fractures, no voids	$\mathbb{M}$	- -	-
-	5 ft 100%	73 1		$\mathbb{M}$	- -	-	
	.55,0		4		$\mathbb{M}$	- -	]
50 <u> </u>	50.5		1	_			_
-			1	Fractures, vertical and vertical, joint color is rust brown infilling less than 1 mm at 52'bgs,	$\mathbb{M}$	medium sand to coarse sand, slightly weathered, close joint spacing	Rock coring rates (min/ft): 3.5/3.5/4/3/4.43
-	R3NQ		2	53'bgs, 54.5'bgs. clay solid, no void	$\mathbb{M}$	- -	-
-	5 ft 100%	80	0		$\mathbb{M}$	<u> </u>	-
-	10070		4			<u>-</u> -	-
55_ 163.8_	55.5		3	_			
-					┧┟	Bottom of Boring at 55.5 ft below ground surface on 3/12/07 15:30	Water was encountered at 38' bgs during drilling;
-					┧┟	- -	2. Water was at 32 ft bgs
-					<u> </u>	- -	after rock coring.
-					1	- -	-
60_ 158.8_				_	<u> </u>	<del></del> -	-
-					╛╏	- -	-
-					<u> </u>	- -	- -
-					<u> </u>	- -	-
-					<u> </u>	- -	-
65_ 153.8_				_	<b>1</b>	 -	
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70 <u> </u>				_	┧┟	<u> </u>	
-					$\dagger \dagger$		



BORING NUMBER: PROJECT NUMBER: 339179.RD.FI

**BH-02** 

SHEET 1 OF 2

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463110.0 N, 1281389.4 E)

ELEVATION: 217.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER				1100 1 11001 1110	unted, CME 55, 2-1/4" ID HSA, 140 Ib nammer with catheac START : 3/13/07 07:45 END	) : 3/15/		
			GRADE (ft)	STANDARD	SOIL DESCRIPTION		П	COMMENTS
	INTERV	AL (ft)		PENETRATION TEST RESULTS			Σ	
		RECOVERY (in)		TEOT REGUETO	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR			DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	Y	SYMBOLIC LOG	INSTRUMENTATION
217.9 <sub>_</sub>	0.0 1.0	8.0	S1SS	2-6	Top Soil* brown, dry, grass (fill)		<i></i> √√.	
_	2.0	6.0	S2SS	2-5	Elastic Silt* (MH) brown, moist, stiff, low plasticity, estimated 10% clay,	1	$\bowtie$	PP=0.5 tsf
<u> </u>	3.0	8.0	S3SS	2-3	5% fine sand (fill)	1	$\bowtie$	PP=2.25 tsf PP=0.5 tsf
_	4.0	3.0	S4SS	4-5	estimated 10% sand , 25% clay	- →	$\bowtie$	PID=0 PP=0.5 tsf
5_ 212.9	5.0	3.0	S5SS	2-2	Lean Clay* (CL)		$\bowtie$	PP=0.75 tsf
-	6.0	10.0	S6SS	7-11	brown, moist, stiff to very stiff, fine grained, very low plasticity, estimated 25% silt, trace fine sand (fill)	7	$\otimes$	PP=2 tsf
_	7.0	11.0	S7SS	12-11	brick fragments	7	$\langle \! \rangle$	PP=1.25 tsf
-	8.0	9.0	S8SS S9SS	16-19 26-40	Sandy Silt (ML)		$ \otimes $	PP=0.75 tsf. Sand = 25.8%, silt = 73.6 %, clay
-	9.0			30-25-35	brown, moist, hard, medium plasticity, trace asphalt chunks, brick, wood, and ash, (fill)	3	$\otimes$	= 0.6%. LL=42, PL=25, and Pl=17 PP=0.75 tsf
10 <u> </u>	10.5	14.0	S10SS	(60)			$\otimes$	Note: Split spoon was sampled every 1 ft for
-						-	X	top 10 ft due to Unexploded Ordnance (UXO) check. UXO check was performed every 1 ft
_						7	$\bowtie$	from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO interference was detected. No
_	13.5	4.0	S11SS	35-22-15	Silty Sand* (SM)		$\stackrel{\times}{\otimes}$	elevated Photo Ionisation Detector (PID) readings.
15	14.6	4.0	31133	(37)	brown, moist, dense, some mica, weathered rock, (fill)  Begin Rock Coring at 14.6 ft below ground surface	1)	$\bowtie$	
202.9_					See the next sheet for the rock core log	-		
- -						=		
_ _						‡		
_						1		
20 <u> </u>						4		
-						1		
_						7		
_						3		
_						}		
25 <u> </u>						_		
-						-		
-   -						=		
-   -						=		
30						=		
30_								



339179.RD.FI BH-02

SHEET 2 OF 2

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463110.0 N, 1281389.4 E)

ELEVATION: 217.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : Truck Mounted, CME 55, NQ size double tube core barrel

ORIENTATION : Vertical

CORING	S EQUIPMEN	ORIENTATION : Vertical					
WATER	LEVELS:			START : 3/13/07 07	:45	END: 3/15/07 15:30	LOGGER : L. Seraydarian
>	6)			DISCONTINUITIES	G	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
15_202.9_ 	14.6 R1NQ 5 ft 77%	53	2 0 4 3	14'9 to 16'10: Mechanical Break medium rough, gently to moderately dipping, some brown staining, thin sand infilling, narrow separation		— Gneiss* (BOULDER)  very dark bluish gray (Gley 2 3/1 10B) when it is wet, light bluish gray (Gley 2  8/1 5B) when it is dry, hard, medium sand to coarse sand, slightly weathered, close to moderate close spacing	16.10'-17.0' break through, possible soil layer between boulders  18.4'-18.8' break through
197.9_ - - - - - - 25_	R2NQ 5 ft 40%	32				-	20.2'-21.4' break through  22.0'-22.10' break through  23.1'-23.11' break through  24.4'-24.8' break through
192.9_ - - - - - -	R3NQ 5 ft 47%	18		steeper dipping	-	Soil* Assumed soil or completely weathered rock	_ 27.4' break through
30_ 187.9_ - - - - -	R4NQ 5 ft 0% 34.6	0		_	-		Note: 1. Unable to core through at 39.6' bgs, possible bedrock. 2. A few pieces of rock fragments were retrieved at
35	R5NQ 5 ft 0%	0		_	-		bottom of the hole. 3. UXO detection was performed at 39'6 bgs, and no UXO interference. 4. Bore hole location offset 3 times. Refusal Encountered at 12.5', 18' and 14.5' bgs
40 177.9_ - - - - - -				_	-	Bottom of Boring at 39.6 ft below ground surface on 3/15/07 15:30	Note: 1. Bottom of core at 39.6' bgs, No water was encountered during drilling; 2. Dry and cave-in at 13.5 ft bgs 3/19/2007
							1



339179.RD.FI BH-03

## **SOIL BORING LOG**

SHEET 1 OF 3

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463237.4 N, 1281390.8 E)

ELEVATION: 213.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

DEPTH BELOW EXISTING GRADE (ft)   STANDARD   PENETRATION   TEST RESULTS   RECOVERY (in)   FATYPE   6'.6'-6'.6'   6'.0'   1.0   3.0   S1SS   3-2   7.0   6.0   S4SS   4-5   5.0   3.0   S5SS   15-11   208.3   6.0   5.0   S6SS   14-20   1.0				AND WILL	TIOD . TIUCK WOL	unted, CME 55, 2-1/4" ID HSA, 140 lb hammer with cathead, 2" START: 3/14/07 10:45 END: 3/1		
NTERVAL (ft)				GRADE (ft)	CTANDADD		Т	•
213.3			AL (ft)	, ,	PENETRATION	SOIL NAME, USCS GROUP SYMBOL, COLOR,	OLIC LOG	DEPTH OF CASING, DRILLING RATE,
1.0   3.0   51SS   3-2   driv, grass roots, sit w fine sand, estimated 5% clay   fill)	10.0			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMB	
2,0   4,0   5,25   3,4	213.3		3.0	S1SS	3-2	dry, grass roots, silt w/ fine sand, estimeted 5% clay	- 1	
10   10   10   10   10   10   10   10	1	2.0	4.0	S2SS	3-4	Elastic Silt* (MH)	$\bigotimes$	
very stiff, with black chunks and sand size particles of asphalt, unconsolidated with hard chunks of aqua colured fibrous material  7.0 6.0 5.0 S6SS 14-20  7.0 6.0 \$75S 15-15  8.0 2.0 \$8SS 13-12  9.0 2.0 \$9SS 3-3  10.3 10.5 11.0 \$10SS (7)  14.0 0.0 \$11SS 50/1  Begin Rock Coning at 14.0 ft below ground surface See the next sheet for the rock core log  20 99.3	1	3.0	4.0	S3SS	2-3		$\otimes$	
5 5.0 3.0 3953 [3-11] asphalt, unconsolidated with hard chunks of aqua colured fibrous material brick fragments    7.0   6.0   5.0   588S   13-12	1	4.0	6.0	S4SS	4-5		$\otimes$	PP=0.25 tst
6.0   5.0   SSSS   14-20		5.0	3.0	S5SS	15-11	asphalt, unconsolidated	$\bigotimes$	DD 40546
7.0 0.0 5/85 13-15  8.0 2.0 S8SS 13-12  9.0 2.0 S9SS 3-3  10.3 10.5 11.0 S10SS 3-3-4 (7)  11.0 S10SS 3-3-4 (7)  12.5 12.5 12.5 12.5 12.5 12.5 12.5 12.5	)8.3_ 	6.0	5.0	S6SS	14-20		$\bigotimes$	
8.0 2.0 S9SS 3-3  9.0 2.0 S9SS 3-3  asphalt chunks  PP=1.75 tsf  Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft No UXO interference was detected. No elevated Photo Ionisation Detector (PID) readings.  14.0 0.0 \( \) \	1	7.0	6.0	S7SS	15-15	brick fragments	$\bowtie$	1.7%
asphalt chunks  PP=1.75 tsf  Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft ft for the 10 ft due to Unexploded Ordnance (UX) check. UXO check was performed every 1 ft for the 10 ft due to UXO check was performed every 1 ft for the 10 ft due to UXO check uxo ft for the 10 ft due to UXO check uxo ft due to UXO check uxo ft for the 10 ft due to UXO check ux	1	8.0	2.0	S8SS	13-12		$\bowtie$	PP=1.U TST
10. 11.0 S10SS 3-3-4 (7)  13.3 10.5 11.0 S10SS (7)  13.6 Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UXO check was performed every 1 ft for top 10 ft due to Unexploded Ordnance (UX check. UX check uxo ft due to Unexploded Ordnance (UX check uxo ft due to Unexploded Ordnance (UX check uxo ft due to Unexploded Ordnance (UX check uxo ft due to UX check uxo ft due to Unexploded Ordnance (UX check uxo ft due to Uxo ft due to Uxo ft	1	9.0	2.0	S9SS	3-3	and all about	$\bowtie$	DD 4.7544
18.5  10.5		40.5	11.0	S10SS	3-3-4 (7)	aspnait chunks	$\bowtie$	
	98.3 - - - 20 - 93.3 - - - - - - - - - - - - - - - - - -	13. <b>5</b> 14.0	0.0	\S11SS/		Begin Rock Coring at 14.0 ft below ground surface See the next sheet for the rock core log		check. UXO check was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO interference was detected. No elevated Photo Ionisation Detector (PID) readings.  Auger refusal were encountered at 5 locations within a 20 ft by 5 ft area. The refusal depths were 18 ft, 17.5 ft, 17.5 ft, 14.5 ft, and 14 ft.
	30						1	
30 -								



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SHEET 2 OF 3

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463237.4 N, 1281390.8 E)

ELEVATION: 213.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : Truck Mounted, CME 55, NQ size double tube core barrel ORIENTATION : Vertical

CORING EQUIPMEN	ORIENTATION : Vertical				
WATER LEVELS :	-	START: 3/14/07	10:45	END: 3/14/2007	LOGGER : L. Seraydarian
		DISCONTINUITIES	()	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft) CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%) FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
15_ 198.3_ - R1NQ - 5 ft - 62%	3 void 50 3	Fracture, medium rough to smooth, 10 to 45 degree. potential void from 14.5'-15.5' bgs		Gneiss* (BOULDER) light gray, (Gley 1 7/N), medium sand to coarse sand, slightly weathered, hard, moderately close spacing	Rock coring rates (min/ft): 2,0,3,4,3
19.0		Fracture, 45 deg, smooth slightly rough, rust brown, very tight, solid, no voids		- - - - <b>Soil*</b> - Possible fill and residual soils	Soils were washed away during coring. Unconfined compressive strength (UCS) = 12979 psi
193.3 - R2NQ - 5 ft - 32%	0			- - - - -	- - - - -
25 188.3 - R3NQ - 5 ft - 0%	0		- - - - - - - - - - - - - - - - - - -	- - - - - - -	- - - - -
30 R4NQ 183.3 2.5 ft 0%	0		- - - - - - - - - -	- - - - - - -	- - - - -
	0	soil and partially weathered rock	- - - - - - - -	- - - - -	- - - -
36.5 	10+ 10+ 5 5	1		Gneiss* dark yellowish brown, (10YR 4/4), medium sand to coarse sand, completely weathered gneiss, breaks apart in hand w/strong light pressure. very close spacing	Rock coring rates (min/ft): 1,1,1,1
- - - - - - - - - - - - - 30%	0	extremely weathered rock was washed away		- - - - -	-



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# **ROCK CORE LOG**

SHEET 3 OF 3

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463237.4 N, 1281390.8 E)

ELEVATION: 213.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING	ORIENTATION : Vertical						
WATER	LEVELS :			START : 3/14/07 10	:45	END : 3/14/2007	LOGGER : L. Seraydarian
>	(9			DISCONTINUITIES	ß	LITHOLOGY	COMMENTS
(£)	N, AND ≪ (%		ES	DESCRIPTION	CLO	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
45					-	-	-
168.3_	45.5		$\bowtie$	-			Dook paring rates (min/ft)
-			4	Fractures, 45 to 85 deg., steeply dipping, pitted in same areas	<b>&gt;</b>	gray, (2.5 Y 5/1), soft, medium sand to coarse sand, extremely weathered	Rock coring rates (min/ft): 2,2,2,2.15
-	2010		10+		+	gneiss, medium rough, close fracture spacing	-
-	R8NQ 5 ft	13	5			-	_
-	73%		5		$\gg$	<del>-</del>	-
50				_	₩		
163.3_	50.5		7		+	-	Rock coring rates (min/ft):
-					1	_	3.08, 3.17, 3.22, 3.25, 3.58
-	R9NQ		2		$\mathbb{X}$	-	
-	5 ft 88%	38	2	Fractures, rust brown in fracture, 10 to 90 deg. , very steeply dipping, moderately close, no		Gneiss* light gray, (Gley 1 7/N), hard, medium	] :
-			1	infilling	+	<ul> <li>sand to coarse sand, possible top of</li> </ul>	-
55 <u> </u>	55 5		3	_	$\rightarrow \gg$	bedrock is at 52.8 ft bgs	
-	00.0		X X.X.		- 1///	Bottom of Boring at 55.5 ft below ground surface on 3/14/2007	_
-					1	ground surface on 3/14/2007	-
-					-	-	-
-					-	_	-
60					1		]
153.3				_	1	<del>_</del> -	_
-					-	-	-
-					-		-
-					1		]
-					1	<u>-</u> -	-
65_					1	_	-
148.3_					-	-	-
-					]	-	_
-					1	<u>-</u>	
-					<u> </u>	-	-
-					-	_	]
70 <u> </u>				-	1		
1+3.3_					1	<u>-</u> -	]
-					<u> </u>		-
] -					-	_	]
-					1	<del>-</del> -	
					+		1



PROJECT NUMBER: 339179.RD.FI

BORING NUMBER: BH-04

SHEET 1 OF 4

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463056.7 N, 1281457.2 E)

ELEVATION: 220.5 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	: 55, 2-1/4" ID HSA, 140 Ib nammer with cathead, 2" OD START : 2/27/07 10:40	ND : 2/28/0		LOGGER : R. Calimer	
			GRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS	
	INTERV	AL (ft)		PENETRATION TEST RESULTS					
		RECOV	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OF	R		EPTH OF CASING, DRILLING RATE, RILLING FLUID LOSS, TESTS, AND	
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALO		0	INSTRUMENTATION	
220.5_	0.0 1.0	10.0	S1SS	1-2	Clayey Silt* (ML) brown, moist, soft, low plasticity, trace organics, trace	ce -	PP=(	0.5 tsf	
_	2.0	9.0	S2SS	3-2	mical (fill)				-
-	3.0	5.0	S3SS	3-4			PP=	1.0 tsf	-
_	4.0	11.0	S4SS	3-4		- \$	×	2516	-
5_	5.0	8.0	S5SS	5-4			X	0.5 tsf	_
215.5_	6.0	9.0	S6SS	2-25			X	1.25 tsf	-
_	7.0	9.0	S7SS	12-17	Sandy Silt* (ML) grayish brown, moist, low to non plasticity, mottled r	red,	PP=2	2.25 tsf	-
_	8.0	10.0	S8SS	12-14	trace rock fragments (fill) concrete and brick at 6.5' some clay, slag/black mat	iterial		and the same that the same to	-
-	9.0	12.0	S9SS	6-10	at 12.8', wet at 8 ft , few rock fragments brick, slag, quartize cobbles	78		n wet; possibly perchered water 1.25 tsf	-
10 210.5	10.5	10.0	S10SS	10-7-13 (20)	gray brown, wet, very stiff, fine to medium grained, I to non plasticity, few rock fragments, brick at 10'	iow _			_
210.5_	10.5					*	Note	: Split spoon was sampled every 1 ft for 0 ft due to Unexploded Ordnance (UXO)	-
-						*	X chec	k. UXO check was performed every 1 ft 0 to 10 ft and at 13.5, 18.5, and 23.5 ft.	-
_	40.5					- ★	X No U	XO interference was detected. No	-
-	13.5	45.0	04400	22-20-34	tan brown, moist, hard, very fine to medium grained	d, 🕸	readi	ngs.	-
15_	15.0	15.0	S11SS	(54)	nonplastic, non-cohesive, trace rock fragments				_
205.5_						1			-
-						<b>*</b>			-
_	40.5								-
-	18.5	40.0	0.4000	20-22-35	Sand And Gravel (GP)			ing sound;	-
20	20.0	10.0	S12SS	(57)	gray brown, wet, very dense, fine to coarse grained, nonplastic, concrete (fill)	', _ <del> </del> &	Grav 13.29	el = 40.6%, sand = 46.2%, and fines = %	_
200.5_						- ★			-
_						<u> </u>			-
_						<b>★</b>			
-	23.5 24.0	6.0	S13SS	50/6	concrete	$\blacksquare$	grind	ing sound;	
25_							Repla	ace 2.25" augers w/3.25" augers	
195.5_						<b>-</b>		er won't go through at 23.5'. It went gh after auger head was changed.	_
_						1		•	-
-						1			-
_	28.5			44.0-	Clayey Silt* (ML)	<b> </b>	X ∏ PP=′	1.25 tsf; LL=25, PL=15, PI=10	-
30	30.0	12.0	S14SS	11-9-7 (16)	orange brown, moist, very stiff, low to medium plast few fine sands, trace rock fragments	ticity,		,	-
	55.0				ion and during, stage rook neighborite				



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SHEET 2 OF 4

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463056.7 N, 1281457.2 E)

ELEVATION: 220.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/27/07 10:40 END : 2/2		12:45 LOGGE	R : R. Calimer
			GRADE (ft)	STANDARD	SOIL DESCRIPTION	Т	COMMENT	
	INTERV	AL (ft)		PENETRATION TEST RESULTS		7		
		RECOVI	ERY (in)	IESI KESULIS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	9	DEPTH OF CASING, DE	RILLING RATE,
			#TYPE	6"-6"-6" (N)	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DRILLING FLUID LÓSS INSTRUMENTA	TION
190.5				(IV)		Ŧ		
						]		
-						$\parallel$		
						1		
_	33.5					41		
-	33.5			4.4.0	Sandy Silt (ML)	╫	PP=2.25 tsf; sand = 28.4%	. silt = 63%, and
]		18.0	S15SS	4-4-6 (10)	gray, moist, stiff to very stiff, low to medium plasticity,	1	clay = 8.6%	, ,
35 <u> </u>	35.0			(10)	little sand, few clay, trace rock fragments	-		_
100.5_			0.74			1		
			ST1			11		
] -	37.0					$\parallel$		
						$\parallel$		
1 ]	38.5					]	ĺ	
-		16.0	S16SS	6-8-8		$\mathbf{H}$		
40	40.0	10.0	31033	(16)		1		
180.5					_	1		_
-						-		
-						1		
						1		
-	43.5					-		
1 +	70.0			44 47 47	Silty Sand* (SM)	#	PP=0.75 tsf	
l ]		13.0	S17SS	14-17-17 (34)	orange brown, wet, dense to very dense, fine to medium	1		
45 <u>175.5</u>	45.0			()	grained, nonplastic, trace rock fragments, trace mica	-[:	1	-
]						<u>]</u> [		
_						4	<b>:</b>	
-						-		
						1		
-	48.5				ven denne	4	. PP=4.5 tsf	
-		16.0	S18SS	5-28-50/6	very dense	┨.	. rr=4.0 tsi	
50_	50.0			(78/12")	_	11	1	_
170.5						#		
						1	:	
]						][		
-						<del> </del>	:	
-	53.5					11:	]	
]	54.4	11.0	S19SS	26-50/5	tan brown	1	PP=2.75 tsf	
55	J <del>4.4</del>			(50/5")		+1	grinding	
165.5					_	1	1	_
-						-[]		
						1	1	
]	E0					4).		
+	58.5	16.5	00555	10.55:5		1	PP=2.0 tsf	
	59.5	12.0	S20SS	12-50/6		1	1	
60						41		_



PROJECT NUMBER: BORING NUMBER
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SHEET 3 OF 4

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463056.7 N, 1281457.2 E)

ELEVATION: 220.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/27/07 10:40	END : 2/28/0		2:45 LOGGER : R. Calimer
			GRADE (ft)	STANDARD	SOIL DESCRIPTION		Т	COMMENTS
1 1	INTERV			PENETRATION TEST RESULTS			SYMBOLIC LOG	
	=	RECOVE	RY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL,	COLOR,	<u>ا</u> إ	DEPTH OF CASING, DRILLING RATE,
		I NECOVI	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DEN CONSISTENCY, SOIL STRUCTURE, MIN	ISITY OR IERALOGY	MBO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#IYPE	6 -6 -6 (N)	CONCIOTENCE, WINC		S.	INOTINO IN LIVINITION
160.5_					Silty Sand* (SM)		111	
_					orange brown, wet, very dense, fine to med nonplastic, trace rock fragments, trace mica	ium grained,		
					nonplastic, trace rook fragments, trace mice	` <u>]</u> :		
_						-		
-	63.6					-1.1		
		1.0	\ <u>S21SS</u> /	50/1		];		
65				(50/1")		-  -		
155.5	65.4				Begin Rock Coring at 65.4 ft below ground	curface =	Щ	Auger refusal at 65.4 ft bgs
_					See the next sheet for the rock core log	surface -	- 1	
				<b> </b>				
-				<b> </b>		4		
						7		
70 <u> </u>								_
150.5_						4	- 1	
-						-	- 1	
						]	- 1	
-						-	- 1	
						1	- 1	
-						4	- 1	
75_							- 1	_
145.5_						4	- 1	
						1	- 1	
-						4	- 1	
							- 1	
_						4	- 1	
							- 1	
80 <u> </u>						$\dashv$		-
140.5						-		
]						1		
-						+		
						1		
-						4		
85 <u></u> 135.5				<b> </b>		4		_
100.5						1		
						1		
-						+		
						1		
1 -						4		
1 . 1								
90							+	
		1						



BORING NUMBER: PROJECT NUMBER: 339179.RD.FI

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SHEET 4 OF 4

## **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463056.7 N, 1281457.2 E)

ELEVATION: 220.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel ORIENTATION: Vertical

COMING	LQUIFINILI	II AIN	D IVIL	IHOD : ATV, CME 55, NQ size double tube core barre			ORIENTATION : Vertical
WATER	LEVELS: 32	2.0 ft t	elow	ground surface START : 2/27/07 10	:40	END : 2/28/07 12:45	LOGGER : R. Calimer
>	(%			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H B	E.R.L.	%) (	F S S	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
FP	SORI	R Q D (%)	RAC ER	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	3YME	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
	65.4	ш.		medium rough, dark brown to black staining,	\ <u>\</u>	Gneiss*	3 Min 22 Sec / ft
-			6	gently to moderate dipping, narrow to very	$\otimes$	light bluish gray, (Gley 2 7/1 10B), fine	3 Will 22 3ec / it
_			4	wide separation.		to coarse grained, soft to hard, moderately weathered to highly	2'37" / ft, UCS = 12916 psi
-	R1NQ		4		1	weathered, close spacing	2 Min 38 Sec / ft
	5.2 ft 99%	58			$\mathbb{K}$	<del>-</del> -	-
-			2			-	2 Min 45 Sec / ft
70 <u> </u>			4	black staining, near vertical fracture, very thinly filled with silt, wide separation	$\mathbb{X}$	<del>-</del>	3 Min 5 Sec / ft
130.5_	70.6			gently to steeply dipping		_	2 Min 33 Sec / ft
-			5	3,,	$\longrightarrow$	_	-
-	Barra		4		$\mathbb{K}$	_	2 Min 39 Sec / ft
-	R2NQ 5 ft	22	6	reddish brown staining, near vertical fracture	-	<del>-</del>	3 Min 4 Sec / ft
-	100%		2	from 71.5'-74', very thinly filled with silt, narrow sepatration.	$\mathbb{N}$	-	3 Min 5 Sec / ft
75						-	2 Min 56 Sec / ft
145.5_	75.6		1		$\mathbb{W}$	-	-
I -			1		$\mathbb{K}$	<ul> <li>medium soft to hard, close to</li> <li>moderate close spacing</li> </ul>	2 Min 26 Sec / ft
-			5		$\rangle\!\rangle$	g	2 Min 42 Sec / ft
_	R3NQ 5 ft	35	4		X	<del>-</del> -	3 Min 6 Sec / ft
-	100%	00		78'1" to 78'6" - black and tan brown staining, near vertical fracture, very thinlyfilled with silt,	$\mathbb{Z}$	-	2 Min 17 Sec / ft
			3	wide separation	1	<del>-</del>	-
80 <u> </u>	80.6		2	_	₩	<del></del>	2 Min 33 Sec / ft
_						Bottom of Boring at 80.6 ft below	Core barrel was not able
_					1	ground surface on 2/28/07 12:45	to be pulled out and abandoned in the hole. The
_					1	_	hole was grouted.
-					1	-	2. Cave-in at 35'7". No water readings.
_					1		-
85 -				_	1	_	_
135.5_					4	-	
-					1	_	]
-					$\mid \mid \mid$	_	-
1 -					1	_	]
-					<b>∤</b>	-	-
					1	_	]
90 <u> </u>				_	+	<u> </u>	-
-					1	-	]
-					$\mid \mid$	-	-
-					1	-	
-					1	-	-
] -					]		]
95					1	<u>-</u>	-
125.5					$\vdash$		
					_		



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BH-05

SHEET 1 OF 4

#### **SOIL BORING LOG**

PROJECT: Washington Aqueduct Residuals Design

LOCATION: (463102.6 N, 1281463.0 E)

ELEVATION: 219.4 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

DRILLING EQUIPMENT AND METHOD: ATV, CME 55, 3-1/4" ID HSA, 140 lb hammer with cathead, 2 OD Split Spoon

WATER LEVELS: 31.0 ft below ground surface START: 3/1/07 11:05 END: 3/6/07 14:00 LOGGER: R. Calimer DEPTH BELOW EXISTING GRADE (ff) SOIL DESCRIPTION COMMENTS STANDARD SYMBOLIC LOG PENETRATION INTERVAL (ft) TEST RESULTS SOIL NAME, USCS GROUP SYMBOL, COLOR DEPTH OF CASING, DRILLING RATE, RECOVERY (in) MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINERALOGY #TYPE 6"-6"-6' (N) 219.4 PP=1.0 tsf (breaks) Silt \* (ML) 9.0 S1SS 1-2 1.0 brown, moist, low plasticity, trace rock fragments, trace organics (fill) 8.0 S2SS 2-3 2.0 coarse quartzite and limestone grained from 3-4' 7.0 S3SS 4-3 3.0 trace sand & rock fragments (fill) 6.0 S4SS 4-3 4.0 Clayey Silt \* (ML) PP=0.75 tsf 9.0 S5SS 2-2 5.0 gray brown, moist, low to medium plasticity 214.4 10.0 S6SS 2-5 6.0 PP=4.5 tsf Chloride=15 ppm, pH= 6.8, Resistivity=4590 Sandy Clay \* (ML) 12.0 S7SS 6-14 tan brown, moist, fine to medium grained, low plasticity, 7.0 ohm-cm, Sulfate=96 ppm trace rock fragments, glass & quartzoe gravel, red brick PP=3.5 S8SS 12.0 21-24 8.0 at 7ft. (fill) Sandy Silt \* (ML) PP=2.0 S9SS 8-7 3.0 Chloride=9 ppm, pH=7.06, Resistivity=3090 ohm-cm, Sulfate=107 ppm. brown, moist, fine to medium grained, low to non 3.0 S10SS 50/3 plasticity, some rock fragments, trace brick and glass, (50/3")PP=1.75, Grinding from 7' to 10' 10 concrete (fill) 209.4 Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO) check. UXO check was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO interference was detected. No 13.5 elevated Photo Ionisation Detector (PID) Sand, Silt, Clay & Gravel \* (ML) readings. 6-25-30 **S11SS** various colors, moist, black slag material (fill) 18.0 (55)15 15.0 204.4 Auger refusal @ 16', 12' and 17.5' bgs. Possible boulder underground. Boring locations offset 3 times within 3' from origional location to avoid boulders. 18.5 gray rock fragments 22-21-17 S12SS 4.0 (38)20.0 20  $199.\overline{4}$ 23.5 Sandy Silt \* (ML) PP=2.0 tsf 8-11-10 11.0 S13SS gray brown, moist, very stiff, nonplastic, few rock (21)fragment (fill) 25 25.0 194.4 28.5 Silty Clay \* (CL) PP=1.5 tsf, LL=31, PL=16, PI=15 3-3-7 **S14SS** 18.0 tan brown, moist to wet, stiff, medium to high plasticity, (10)30 30.0 trace rock fragment (fill)



PROJECT NUMBER: BORING NUMBE	PROJECT NUMBER:	BORING NUMBER

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SHEET 2 OF 4

## **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463102.6 N, 1281463.0 E)

ELEVATION: 219.4 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

VATER	LEVELS	3 : 31.0 ft	below gro	ound surface	START: 3/1/07 11:05	END : 3/6/	07 14	4:00 LOGGER : R. Calimer
			GRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS
[	INTERV	AL (ft)		PENETRATION TEST RESULTS			Ϊ́	
		RECOVI	ERY (in)	LOT RESOLTS	SOIL NAME, USCS GROUP SYMBOL, O MOISTURE CONTENT, RELATIVE DENS	OLOR,	)LIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINE		SYMBOLIC LOG	INSTRUMENTATION
189.4_ - - - -					Silty Clay * (CL) tan brown & gray brown, medium stiff to stiff	- - - -		
-	33.5	14.0	S15SS	4-4-4		- -		PP=2.75 tsf
35 184.4_ - -	35.0			(8)		 - - -		
-	38.5			3-5-7	Silty Sand (SM)			(native)
40 179.4_ -	40.0	18.0	S16SS	(12)	Tan brown, wet, medium dense, very fine to grained, nonplastic, trace rock fragments, an	medium _ d mica _ - -		
-	43.5					- - -		PP=2.0 tsf (non cohesive)
45_ 174.4_	45.0	18.0	S17SS	5-6-10 (16)		_ 		gravel=1%, sand=70.6%, fines=28.3%
-						- - - -		
50	48: <del>5</del>	3.0	\ <u>S18SS</u> /	50/3 (50/3")	Silty Sand * (SM) Tan brown, wet, very dense, fine to coarse gragments, partialy weathered rock	rained, rock		
169.4 - -					паушена,рашау weamered тоск	 - - - -		
1	53.5		04000	F0/F		-	<b> </b>	1
55 -		5.0	\ <u>S19SS</u> /	50/5 (50/5")		-		
55_ 164.4_ - -						 - - -		
- - - - -	58.5 58.7	3.0	\ <u>S20SS</u> /	50/3 (50/3")		- - -		
60_								1
J				· · · · · · · · · · · · · · · · · · ·				



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# **SOIL BORING LOG**

SHEET 3 OF 4

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463102.6 N, 1281463.0 E)

ELEVATION: 219.4 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER LEVELS : 31.0 ft below gr	ound surface	START: 3/1/07 11:05	END : 3/6/07	14:0	00 LOGGER : R. Calimer
DEPTH BELOW EXISTING GRADE (ft)	STANDARD	SOIL DESCRIPTION		. T	COMMENTS
INTERVAL (ft)	STANDARD PENETRATION TEST RESULTS			ġ <b>「</b>	
RECOVERY (in)		SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENS	DLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINEI	RALOGY	MB	INSTRUMENTATION
	(N)		5	Š	
159.4_		Silty Sand * (SM)	nined rook		_
		Tan brown, wet, very dense, fine to coarse gra fragments,partialy weathered rock	allied, lock		-
		, ,	][		_
-			-[1]:		-
63.5			<u> </u>		]
1.0 \S21SS	50/1 (50/1")		4.1		=
65	(30/1)		<b>- </b> [		-
154.4			<b>1</b>		
-			-[]		-
			<b>j</b> .}		
			<b>]</b> }.	<b>: </b>	7
68.5			Ⅎ∤゙		-
0.0 S22SS	50/0		<b>]</b> :[		
<sub>70</sub>					-
70 149.4			<u> </u>		Auger Refusal at 71 ft bgs
71.0		Pogin Pook Coring at 71.0 ft holow ground ou	urface.	Щ	
		Begin Rock Coring at 71.0 ft below ground su See the next sheet for the rock core log	lilace _	-	-
		Ç	1	-	
-			-	-	-
			1	-	_
75			-	-	=
144.4			_	-	
			4	-	-
			-	-	-
			1	-	_
-			-	-	=
			1	-	_
80 -			-	-	-
139.4				-	
			4		-
					-
			1		
			-		-
85 -			4		-
85 <del> </del>   134.4 <u> </u>			-		
			1		-
			-		-
			1		
			-		-
					]
90			7		7
30				+	



BORING NUMBER: PROJECT NUMBER: 339179.RD.FI

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SHEET 4 OF 4

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463102.6 N, 1281463.0 E)

ELEVATION: 219.4 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel ORIENTATION: Vertical

0011111	O EQUII WEN	11 / 11 1	D IVIL	IHOD : ATV, CME 55, NQ size double tube core barre	<i>i</i> 1		ORIENTATION : Vertical
WATER	R LEVELS : 31	1.0 ft b	pelow	ground surface START : 3/1/07 11:	05	END: 3/6/07 14:00	LOGGER : R. Calimer
_ ≥	(%			DISCONTINUITIES	ő	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
ACE	T.R.	(%) Q	F.0	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	٥٦	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
T H	ORE	RQD	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YMB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
□⊠		ď	世正	· ·	Ś	CHARACTERISTICS	
-	71.0		4	medium rough, dark brown staining, gently to medium dipping, thin silt and sand infilling,	<b>-</b>   \	Gneiss* light greenish gray, (Gley 1 7/1 10Y),	greenish gray return water, 2 min 17 sec/ft, UCS =
-	1		5	narrow to wide separation	7//	fine to coarse grained, very soft to med	7962 psi
-	R1NQ		5		1	soft, slightly weathered to highly	2 min 28 sec /ft
-	5 ft	55	4		-	weathered, close spacing	2 min 39 sec /ft
_	100%		3		<b>1</b> 33	-	3 min 31 sec /ft
75 <u> </u>	- 1			-	-\//	_	2 min 5 sec /ft, UCS = 6161
1	76.0		2	medium rough, dark brown and yellow orange,	<b>*</b>	-	psi
_			4	narrow, steeply dipping joint	$\mathbb{Z}$	medium soft to hard, slightly	2 min 48 sec /ft
-	-		_		<b>-</b> >>>	weathered to moderately weathered	2 min 11 sec /ft
	R2NQ		3		$\mathbb{X}$	<del>-</del>	]
-	5 ft	57	5		<b>-</b>	-	2 min 34 sec /ft
-	100%		2		$\mathbb{W}$	-	2 min 19 sec /ft
80 <u> </u>	_			-	->>>		2 min 50 acc /ft
139.4	81.0		3		+	-	3 min 58 sec /ft
_			5	medium rough	<b>1</b> ///	soft to medium soft, very close, close	2 min 24 sec /ft
-	1				<b>-</b>	_ spacing	1 min 57sec /ft
_	R3NQ		5			<del>-</del> -	]
-	5 ft	42	3		<b>-</b> >>>	-	2 min 29 sec /ft
	100%		4		$\mathbb{X}$	-	2 min 43 sec /ft
85 <u> </u>	- 1		_	-	<b>-</b> >>>	_	2 min 56 sec /ft
104.4	86.0		4		$\mathbb{W}$	-	2 mm 30 sec /it
_					1	Bottom of Boring at 86.0 ft below	Note:
-	1				1	ground surface on 3/6/07 14:00	86 ft long PVC pipe in 1"     diameter was installed in
	]				1		BH-05 as temporary well.
-	_				4	-	Bottom 10 ft was slotted.
_	1				1	<del>-</del>	2 Water was 34' 11" bgs at
90 <u> </u>	- 1			_	4	_	15:00PM on 3/8/07
120.4	j				1	<del>-</del>	3. Water at 31', 3/20/07
] -	-				4	-	07:40
-	1				1	-	-
	]				1	<u>-</u> -	]
-	1				1	<b>-</b>	-
	]				1	- -	
95 <u> </u>				-	4	<del>_</del>	-
124.4	1				1	-	-
	]				1	<u> </u>	]
-	1				1	<del> </del>	-
	]				1	<del>-</del>	
-	-				-	-	-
-	j				1	_	
100 119.4	.			-	4	_	
118.4	1				1	-	-



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# **SOIL BORING LOG**

SHEET 1 OF 4

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463151.4 N, 1281466.6 E)

ELEVATION: 218.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	S: 32.5 ft	below gr	ound surface		3/8/07	
DEPTH E			GRADE (ft)	STANDARD	SOIL DESCRIPTION	g	COMMENTS
	INTERV	AL (ft)	ERY (in)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMB	INSTRUMENTATION
218.5_	0.0 1.0	9.0	S1SS	2-2	Silt * (ML) brown, moist, medium stiff, low to non plasticity, trace	-	PP=1.0 tsf
-	2.0	8.0	S2SS	3-3	organics, trace sand, rock fragments (fill)	-	
-	3.0	6.0	S3SS	4-4	Clay Silt * (ML) brown, moist, medium stiff, low to non plasticity, (fill)		
_	4.0	6.0	S4SS	4-4	and the con-		DD 0.75 tof (housely)
5_	5.0	8.0	S5SS	3-3	gray and brown		PP=0.75 tsf (breaks)
213. <u>5</u> -	6.0	12.0	S6SS	2-4		-	
-	7.0	12.0	S7SS	9-9	Sandy Silt * (ML) gray brown, moist, stiff, nonplastic, trace rock fragment	s 🕸	PP=3.5 tsf (breaks)
-	8.0	9.0	S8SS	9-7	(fill)		
-	9.0	4.0	S9SS	4-7	tan brown, some clay, little rock fragments, quartize gravel, brick fragments		PP=1.0 tsf (breaks)
10 208.5	10.5	11.0	S10SS	3-7-11 (18)	gray brown, very stiff		
200.5_	10.5						Note: Split spoon was sampled every 1 ft for
_							top 10 ft due to Unexploded Ordnance (UXO) check. UXO check was performed every 1 ft
_	40.5						from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO interference was detected. No
_	13.5	44.0	04400	4-3-12	asphalt at 14.5'		elevated Photo Ionisation Detector (PID) readings.
15	15.0	14.0	S11SS	(15)			
203.5_						- ‡⊗	
_						- ‡⊗	
_	40.5					- ‡⊗	
_	18.5		0.4000	3-5-6	tan brown, stiff, few rock fragments	- ‡⊗	PP=0.5 tsf
20	20.0	14.0	S12SS	(11)			
198. <u>5</u> _							
_						- ‡⊗	
_							
_	23.5			17-9-10	Clayey Silt * (ML)		
25	25.0	12.0	S13SS	(19)	tan brown, moist, very stiff, trace sand and rock fragments, black slag at 23.5', wood at 25' (fill)	_}	
193.5_						$\exists$	
-						18	
-						1	
_	28.5			0.5.5	Silty Clay * (CL)	<b>-</b>	PP=2.75 tsf, LL=29, PL=16, PI=13
30		16.0	S14SS	3-5-5 (10)	brown, moist, stiff, medium to high plasticity, trace rock fragments, possible fill		1. 2. 3 (2., 22 25), 2 (3, 1 1 1 3
					nag nama, padama m		1



PROJECT NUMBER:	BORING NUMBER

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SHEET 2 OF 4

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463151.4 N, 1281466.6 E)

ELEVATION: 218.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	S : 32.5 ft	below gr	ound surface	START: 3/5/07 11:40	END : 3/8/0	7 1	5:30 LOGGER : R. Calimer
DEPTH E	BELOW E	XISTING	GRADE (ft)	STANDARD PENETRATION	SOIL DESCRIPTION		Ŋ	COMMENTS
	INTERV	AL (ft)		PENETRATION TEST RESULTS	0011 11115 11000 0000 0000		SYMBOLIC LOG	DEDT. LOS 0.40N/G
		RECOV	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLO MOISTURE CONTENT, RELATIVE DENSITY	UR, 'OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERAL	LÓGY	YMB	INSTRUMENTATION
188.5	30.0			(N)	Fat Clay* (CH)		S	DD=0.25 tof, collect shells: title
100.5_	30.0		0.74		brown, moist, stiff, medium to high plasticity			PP=0.25 tsf, collect shelby tube
			ST1		<b>3</b>			
_	32.0							
-	33.5				Sandy Silt* (ML)			PP=0.5 tsf
		16.0	S15SS	5-4-17 (21)	tan brown, wet, very stiff, nonplastic, trace rock			FF-0.5 tSi
35_	35.0			(21)	fragments, partially weathered rock	-		
183.5_						-		
_						=		
-	38.5			46-50/3		-		PP=1.5 tsf
-	39.3	9.0	S16SS	(50/3")		-		1   - 1.0 tol
40_								
178.5_						-		
_						_		
-						-		
-						-		
	43.5			25 50/5		]		DD 4054 6
-	44.4	11.0	S17SS	35-50/5 (50/5")		-		PP=1.25 tsf
45_								
173.5						-		
_								
-						-		
_	48.5			05.40.50/0	Silty Sand * (SM)		₩.	
-	49.6	14.0	S18SS	25-40-50/2 (90/8")	tan brown, wet, very dense, nonplastic, trace rocl	k -		
50_	40.0			(00.0)	fragments, partially weathered rock	4		
168.5						-		
-						4		
-						=		
]	53.5 53.8	3.0	01000	F0/2	County Cilé* (BAL)			
-		3.0	S19SS	50/3 (50/3")	Sandy Silt* (ML) tan brown, wet, very stiff, nonplastic, trace rock	-		
55_					fragments, partially weathered rock			
163.5						-		
]								
-						-		
_						-		
	58.5 58.8	3.0	S20SS,	50/3		]		
-		3.0	<u>32033</u> ,	(50/3")		-		
60_								
			1					



PROJECT NUMBER:	BORING NUMBER:
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#### **SOIL BORING LOG**

SHEET 3 OF 4

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463151.4 N, 1281466.6 E)

ELEVATION: 218.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	ATER LEVELS: 32.5 ft below ground surface		ound surface	7 15:30 LOGGER : R. Calimer				
DEPTH E	BELOW E	XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION		ڻ	COMMENTS
	INTERV	AL (ft) RECOVE	ERY (in)	STANDARD PENETRATION TEST RESULTS  6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
158.5	63.5 63.9 66.8	5.0		6"-6"-6" (N)  50/5 (50/5")	Sandy Silt* (ML) tan brown, wet, very stiff, nonplastic, trace rock fragments, partially weathered rock  few rock fragments  Begin Rock Coring at 66.8 ft below ground surface See the next sheet for the rock core log		SYMB(	Auger refusal at 66.8 ft



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SHEET 4 OF 4

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463151.4 N, 1281466.6 E)

ELEVATION: 218.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel

ORIENTATION : Vertical

COMIN	J LQOII WILL	II AN	D IVIL	THOD: ATV, CME 55, NQ size double tube core barre	1		ORIENTATION : Vertical
WATER	R LEVELS : 32	2.5 ft b	pelow	ground surface START : 3/5/07 11:	40	END : 3/8/07 15:30	LOGGER : R. Calimer
≥	(%			DISCONTINUITIES	õ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A CE	I.R.U T.H.	(%) Q	150 150 150	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	SOL	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
EPT	ORE	RQD	ZAC ER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	YME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
0 0	O∃£ -66.8	Ω.	℡凸	,	SZZ		
-	00.0		4	medium rough, dark brown to orange brown staining, gently to moderately dipping, very	188	Gneiss* fine to coarse grained, med soft to	light gray water return, 2 min 34 sec /ft
-	R1NQ		3	narrow to wide separation, very thin sand and	<b>*</b> //	hard, slightly weathered to moderately	2 min 28 sec /ft, UCS = -
-	4.2 ft	48		silt infilling	1	weathered, gray (Gley1 6/1 10Y) when it was wet, llight bluish gray (Gley 2	7136 psi = - 2 min 54 sec /ft = -
70 -	92%		4		-\{//	8/1 5B) when it was day, close	2 min 34 sec /it
148.5	4		3	medium rough, dark brown orange & orange	<b>1</b> >>>	spacing	4 min 12 sec /ft
-	71.0		XXX	brown staining, steeply dipping fracture and	- 🖔	hard, fresh to slightly weathered,	3 min 19 sec /ft
-	]		3	thinly filled with silt, wide separation near vertical fracture, orange brown staining,	<b>1</b>	moderately close to wide spacing	
-	-		1	very thinly filled with silt	-100	}-	3 min 53 sec /ft
[ ]	R2NQ 5 ft	92	1		1	<u>t</u>	3 min 20 sec /ft
-	103%	52			<b>-</b>	1	3 min 42 sec /ft
75_	1		1	_	1//	<u>L</u>	J 111111 42 360/10
143.5	76.0		1		<b>-</b>	-	3 min 34 sec /ft
1 -	70.0		0		1	<u>†</u>	3 min 12 sec /ft, blueish
] -	-			a four manhanical joint	<b>-</b>	}	gray water return3 min 12 sec /ft
-	PONO		1	a few mechanical joint	<b>K</b>	-	3 min 12 sec /it
-	R3NQ 5 ft	97	0		1	[	3 min 56 sec /ft
-	97%				+	<del> </del>	3 min 42 sec /ft
80 <u> </u>	]		2	-	<b>\</b> //	T <del></del>	0
130.5_	81.0		0		<b>-</b>	+	3 min 51 sec /ft
_			1	medium rough, some dark brown and orange	$\mathbb{Z}$	slightly weathered to moderately	1
-	-			brown staining, sand and silt infilling, moderately dipping, narrow separation	<b>-</b> >>>	weathered, close to moderately close spacing	3 min 16 sec /ft
] -	R4NQ		0		$\mathbb{K}$		
-	5 ft	105	2		<b>-</b> >>>	-	4 min 4 sec /ft
	105%		0		$\mathbb{X}$	<del>[</del>	4 min 42 sec /ft
85 <u> </u>	1			-	->//	}-	4 min 22 sec /ft
[ -	86.0		2		<b>X</b>	D # (D : :::::::::::::::::::::::::::::::	3 min 4 sec /ft
-	1		^-^-		-	Bottom of Boring at 86.0 ft below ground surface on 3/8/07 15:30	Note: 1. Water was 32'6" bgs at
	1				1	E	17:50 on 3/8/2007. Cave in _
-	1				-	<b>F</b>	at 33' bgs
	]				1	[	2. Water was 33' bgs at
90 -	-				-	F	14:28 on 3/9/2007. Cave in at 36' bgs
128.5	1			-	1	<del>-</del> -	
-	-				-	ŀ	-
	1				1	<u> </u>	
-	-				-	ŀ	-
	1				1	<u> </u>	
-	-				-	<b>-</b>	-
95 <u> </u>	1			_	1	L	
123.5_	-				-	-	-
	1				1	<u> L</u>	
					1		
<u></u>							



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SHEET 1 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463051.9 N, 1281517.3 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS			ound surface	START : 2/26/07 00:08 END : 2/2	26/07	17:15 LOGGER : R. Calimer	
			GRADE (ft)		SOIL DESCRIPTION	1	COMMENTS	
1 [	INTERV	AL (ft)		PENETRATION		700		
1		RECOVE	ERY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	ZLIC	DEPTH OF CASING, DRILLING RATE,	
			#TYPE	6"-6"-6" (N)	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
222.1_	0.0 1.0	12.0	S1SS	2-2	Silt * (ML) brow, moist, soft to medium stiff, low plasticity, trace fine	-	PP=1.0 tsf	-
	2.0	8.0	S2SS	3-3	sand, trace organics (fill)	$\mathbb{R}$		_
	3.0	7.0	S3SS	2-2	trace rock fragments		PP=0.25 tsf	-
	4.0	10.0	S4SS	3-4			DD 0.751 (	-
5 217.1	5.0	10.0	S5SS	6-6	gray brown, little clay, no organics		PP=0.75 tsf	_
217.1	6.0	12.0	S6SS	2-8	0 1 0 1 4 4 1	$\Rightarrow$	DD 4051 (	-
	7.0	12.0	S7SS	8-15	Sandy Silt * (ML) tan brown, moist, very stiff, low to non plasticity, fine to		PP=1.25 tsf	-
	8.0	10.0	S8SS	10-16	medium sand , few rock fragments, gray concrete at 6.5' and 7.5', trace brick fragments (fill) 3"		DD-2.25 tof	-
	9.0	6.0	S9SS	8-9	Silty Sand * (SM) blackish gray, moist to dry, medium dense, rock		PP=2.25 tsf	-
10 212.1	10.5	16.0	S10SS	4-20-18 (38)	fragmets brick, non cohesive (fill)  Sandy Silt* (ML) gray brown, moist, medium stiff to hard, low to non	₩	PP=1.5 tsf PP=1.0 tsf	_
212.1	10.5				plasticity, brick and concrete at 9.5' (fill)		Note: Split spoon was sampled every 1 ft for	-
1 -						-	top 10 ft due to Unexploded Ordnance (UXO) check. UXO check was performed every 1 ft	_
1 1						1	from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft.	_
1 -	13:5					+	No UXO interference was detected. No elevated Photo Ionisation Detector (PID)	-
1 1		1.0	S11SS	50/1		1	readings. PP=0.75 tsf	_
15				(50/1")		₩	grinding from 10-13'	-
207.1					_	$\rightarrow$	Possible boulders	_
1 =						$\pm$		_
1 -						-₩		-
1 -								_
1 +	18.5				Silty Sand* (SM)	+	PP=0.25 tsf	-
		15.0	S12SS	14-11-3 (14)	tan brown, moist, medium dense, nonplastic, very fine	1	gravel=3.1%, sand=79.5%, fines=17.4%	_
20 202.1	20.0			(,	to fine sand , trace micas, few rock fragments (fill)	-₩		_
1 ]						1		_
1 -						+		-
						100		_
1 -	23.5					+		-
		40.0	04606	4-6-9	Silt Clay * (CL)		Replace with 3-1/4" augers, wet spoon	_
25	25.0	16.0	S13SS	(15)	brown, moist to wet, stiff to very stiff, medium to high plasticity, trace fine sands (fill)	₩	PP=3.25 tsf	-
197.1					Sandy Silt * (ML)	<b>↓</b> ₩	3	_
1 -					orange brown, moist to wet, stiff, nonplastic, few rock fragments (fill)	+	3	-
					3( )	<b>1</b> 000		_
1 -						+		-
	28.5				011 01 + (01)	$\mathbb{X}$	DD 0.754 (	_
1 -		16.0	S14SS	4-4-6	Silty Clay * (CL) yellowish pink, moist to wet, stiff, medium to high	<b>-</b>	PP=0.75 tsf LL=27 , PL=15 ,PI=12	-
30	30.0			(10)	plasticity, trace fine sand and rock fragments (fill)	<b>1</b> 000	,,	



PROJECT NUMBER:	BORING NUMBER

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# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463051.9 N, 1281517.3 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	35.4 ft	below gro	ound surface	START : 2/26/07 00:08 EN	ND : 2/26	/07 1	17:15 LOGGER : R. Calimer
	DEDTIL DEL OM EVIOTINO ODADE (6)			STANDARD PENETRATION	SOIL DESCRIPTION		Ö	COMMENTS
	INTERV	AL (ft)		PENETRATION TEST RESULTS			C LO	
		RECOVI	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLOR MOISTURE CONTENT, RELATIVE DENSITY OF	R,	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALO		SYMBOLIC LOG	INSTRUMENTATION
192.1_				( )		_	$\otimes$	-
-						-	XX	-
						1	$\bowtie$	_
-						-	$\bowtie$	-
	33.5						$\bowtie$	
_		18.0	S15SS	3-6-5	Clayey Silt (ML) gray, moist, stiff, little sand, trace rock fragments, la	arne -	$\bowtie$	PP=0.5 tsf sand=17.9%
35	35.0	10.0	01000	(11)	(>6") wood fragment, with black staining on soil (fill		$\bowtie$	silt=66.8%
187.1_						-	$\bowtie$	clay=15.3%
_							$\bowtie$	<u>-</u>
] -						4	$\bowtie$	-
-						<u> </u>	$\bowtie$	-
	38.5 38.8	4.0	S16SS	50/4	Silty Sand (SM)		XX	PP=2.25 tsf
-		4.0	<u> </u>	(50/4")	tan brown, wet, very dense, fine to medium grained	1, ┪		PP-2.25 (SI
40 <u> </u>					trace rock fragment		.	
102.1_						-		<del>-</del>
						]		-
-						-		-
_								_
-	43.5				very fine grained, few micas	-		PP=1.0 tsf
		15.0	S17SS	13-28-36 (64)	very line grained, lew fileds			sand=71.8%
45 <u> </u>	45.0			(0.)				fines=78.2%
	]						:	<u> </u>
-						-		-
								_
-	18.5					4		-
	48.5 48.8	10.0	S18SS	43-50/4			.	PP=2.0 tsf
50 -				(50/4")/		_		-
172.1						_		
						]		-
-						-[		-
							:[][	-
-	53.5 53.8					4		-
	53.8	3.0	<u>S19SS</u>	50/3				PP=0.25 tsf
55				(50/3")		-	][]]	-
55 167.1_						コ		
-						-		-
								_
-						4		-
	58.5 58.8							
-	50.0		S20SS	50/4 (50/4")		-[		PP=1.25 tsf Auger Refusal at 62.9' bgs on 2/26/07 14:00
60				(55,7)			<u> </u>	1. 14.00 11.00 11.00 11.00 11.00 11.00 11.00



PROJECT NUMBER:	BORING NUMBER

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#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463051.9 N, 1281517.3 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/26/07 00:08	END : 2/26		17:15 LOGGER : R. Calimer			
					SOIL DESCRIPTION	<u> </u>		COMMENTS			
1	INTERVAL (ft)			BELOW EXISTING GRADE (ft)			STANDARD PENETRATION TEST RESULTS			LOG	
1				RECOVERY (in)		TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, CO	COLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,	
1		1,200	#TYPE	6"-6"-6"	SOIL NAME, USCS GROUP SYMBOL, MOISTURE CONTENT, RELATIVE DEN CONSISTENCY, SOIL STRUCTURE, MIN	ISTLY OR IERALOGY	MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION			
			#ITPE	(N)	00.10.0.2.10.1, 00.12.0.1.00.0.1.2,		SYI				
162.1_						_	$\Pi$	_			
-						_		-			
						_		_			
-	62.9					-		-			
-	02.0				Begin Rock Coring at 62.9 ft below ground	surface	114	_			
_					See the next sheet for the rock core log	=		<u>-</u>			
65						-		-			
157.1											
1 -						-		-			
1 -						_		_			
1 -						-		-			
1 =						_		<u>-</u>			
1 -						=		-			
70 152.1_						_		-			
152.1_								-			
_						_		-			
_						_					
-						-		-			
-						_		<u>-</u>			
-						_		-			
75						_					
147.1_						-		-			
-						-		-			
-						_		-			
-						_		-			
-						_		_			
-						-		-			
80						_					
142.1						-		-			
1 -						_		_			
1 -						=		_			
1 -						_		-			
1 -						=		-			
-						-		-			
85 137.1_											
137.1						-		-			
1 -						- -		_			
1 -						_		-			
1 =								_			
1 -						=		-			
1 -						-		-			
90_											
1											
L		l									



PROJECT NUMBER: 339179.RD.FI BORING NUMBER: BH-07

SHEET 4 OF 4

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463051.9 N, 1281517.3 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMEN	NA TI	D ME	THOD: ATV, CME 55, NQ size double tube core barre	el		ORIENTATION : Vertical
WATER LEVELS: 3	5.4 ft l	oelow	ground surface START : 2/26/07 00	0:08	END: 2/26/07 17:15	LOGGER: R. Calimer
> 6			DISCONTINUITIES	ڻ ن	LITHOLOGY	COMMENTS
ELOV E (ft) JN, AND	<u> </u>	RES JT	DESCRIPTION	IC LO	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
DEPTH BELOW SURFACE (ft) CORE RUN, LENGTH, AND RECOVERY (%)	RQD(%)	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
= 62.9 = R1NQ		3	medium rough, dark yellowish brown staining, modrately dipping, narrow to wide separation,		Gneiss* fine to coarse grained, soft to hard,	2 Min 37 Sec /ft
2.3 ft 99%		3	medium rough, undulating, 64.2' to 64.7' -		moderately weathered to slightly weathered, greenish gray (Gley1 5/1	2 Min 36 Sec /ft
157.1		4	vertical fracture - brown orange & black staining		5GY) when it was wet, light bluish gray (Gley1 7/1 10B) when it was dry highly weathered from 65'-65.17'	1 Min 52 Sec /ft
-		1			- Ingrily weathered from 65-65.17	2 Min 16 Sec /ft
R2NQ 5 ft 100%	83	2			- 3" completely weathered fracture at	2 Min 25 Sec /ft -
100%		2	slightly rough, fracture filled with silt and sand , wide to very wide separation.		67'10", decomposed to rock and sand	2 Min 33 Sec /ft -
70_ 152.1		2	-		- 	2 Min 24 Sec /ft
		3	medium rough, brown, 70.3' to 70.6' - nearly vertical fracture, narrow		close to moderate close spacing	-
R3NQ		2	gently to moderate dipping		- -	2 Min 56 Sec /ft, UCS = -6779 psi -
5 ft 95%	65	3			- -	3 Min 12 Sec /ft - 2 Min 25 Sec /ft -
_ 		2	possible mechanical break at 74'.4"		- -	3 Min 22 Sec /ft -
75		2 ××× 1	possible mechanical break at 74.4		<del></del> -	2 Min 15 Sec /ft -
- R4NQ - 2.7 ft					- -	2 Min 55 Sec /ft
- 94% - 77.9		7	76.9' to 77.9' - vertical and horizontal fractures, very thin infilling to no infilling,		- -	-
-			orange brown and black staining	1	Bottom of Boring at 77.9 ft below ground surface on 2/26/07 17:15	Note: 1. Water at 35.5', cave in at 58' bgs on 2/27/2006 10:00.
80 142.1			-	1	 - -	2. Water at 35.4', cave in at 56' bgs.
-				1	= -	-
				1	- -	-
				]	= <del>-</del> -	]
85 <u> </u>			-	] [	-  -	_
				վ	<del>-</del> -	]
				1	- -	<u> </u>
				1	- -	]
90				1	- -	]
132.1			_	]	<del></del> - -	
				} [	- -	]
-				1	-	-



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SHEET 1 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463104.3 N, 1281523.3 E)

ELEVATION: 221.2 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	: 35.3 ft	below gr	ound surface	START : 2/22/07 09:30 END	: 2/23/	07 1	11:30 LOGGER : R. Calimer	
DEPTH E	BELOW E	XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION		90	COMMENTS	
	INTERV	RECOVE	ERY (in)	PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	′	SYMB	INSTRUMENTATION	
221.2_	0.0 1.0	10.0	S1SS	1-2	Silt* (ML) brown, moist, medium stiff, low plasticity, trace rock		$\bigotimes$	PP=1.25 tsf	
-	2.0	10.0	S2SS	3-3	fragments, trace orgnic (fill)	_	X	DD 0	
-	3.0	5.0	S3SS	3-3	low to medium plasticity, wood chip	_	$\overset{\times}{\otimes}$	PP=0.75 tsf	
_	4.0	3.0	S4SS	3-2		-	$\otimes$	PP=0.5-1.5 tsf	
5_ 216.2	5.0	9.0	S5SS	4-4		_	$\overset{\otimes}{\otimes}$	11 -0.0-1.0 (3)	_
_	6.0	10.0	S6SS	3-5		7	$\otimes$	PP=4.5 tsf	
_	7.0	7.0	S7SS S8SS	5-8 8-50/5	Sandy Silt* (ML)	$-\frac{1}{2}$	$\overset{\circ}{\otimes}$	Grinding from 6.5' to 12' possible boulders	
-	8.0	2.0	S9SS	(50/5") 50/2	brown, moist, very dense, low to non plasticity, fine to medium grained sand, few rock fragments, trace brick		$\overset{\times}{\otimes}$		
- 10	9.0	4.0	S10SS	(50/2") 50/4	fragments, gray rock pieces, concrete pieces (fill) very dense	-	$\otimes$		
211.2	10.5	4.0	31033	(50/4")		7	$\overset{\times}{\otimes}$		-
_						-	$\otimes$		
						3	$\bigotimes$		
-	13.5		04400	40.50/0	Silty Sand * (SM)		$\overset{\times\times}{\otimes}$	gravel=9.2%, sand=49.8%, fines=41%	
15 <u> </u>	15.0	7.0	S11SS	13-50/6	dark gray, moist, very dense, nonplastic, fine to mediu grained sand, trace micas, some rock fragments, quar rock at the end of spoon (fill)	ım tz _	$\otimes$	Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO)	_
_					rock at the end of spoon (iiii)	_	$\otimes$	check. UXO check was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft.	
_						1	$\overset{\times}{\otimes}$	No UXO interference was detected. No elevated Photo Ionisation Detector (PID)	
_	18.5						$\bigotimes$	readings.	
-		16.0	S12SS	5-8-14 (22)	Sandy Silt* (ML) gray brown, moist, very stiff, fine to medium grained,	4		PP=1.5 tsf	
20 201.2	20.0			(/	low to non plasticity, few rock fragments, trace micas, (possible fill)	Ⅎ			-
_						4			
-						4			
	23.5			7-5-5	Silty Sand* (SM)	<b>-</b> -}.		sand=71.2%	
25_	25.0	14.0	S13SS	(10)	greenish gray, moist, loose to medium dense, very fine to medium grained, trace rock fragments, trace mica	e _]		fines=28.8%	_
196.2_ -						‡			
- -						‡			
-	28.5					‡			
30	30.0	16.0	S14SS	9-14-16 (30)	brown, dense	- - -			
JU	30.0			. ,			111		



PROJECT NUMBER: BORIN	G NUMBER:

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SHEET 2 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463104.3 N, 1281523.3 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

VATER	LEVELS	3 : 35.3 ft	below gr	ound surface	START: 2/22/07 09:30	END : 2/2	3/07	11:30 LOGGER : R. Calimer
DEPTH E	BELOW E	XISTING (	GRADE (ft)	STANDARD PENETRATION	SOIL DESCRIPTION		Ŋ	COMMENTS
	INTERV	INTERVAL (ft)  RECOVERY (in)		PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSI	OLOR,	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINEI	RALOGY	SYMB	INSTRUMENTATION
191.2 _					Silty Sand* (SM) brown, moist, dense to very dense	-		
-						-		
-						-		
-	33.5	15.0	S15SS	12-16-19		-		Chloride=12 ppm, pH=4.9, Resistivity=437 ohm-cm, Sulfate=63 ppm.
35 <u> </u>	35.0	15.0	31333	(35)		_		onm-cm, Sullate=63 ppm.
-						-		
_						-		
-	38.5					-		
_	00.0		S16SS	14-33-41	tan brown, very dense, very fine to fine graine	d _		
40 181.2	40.0		0.000	(74)		_		
-						-		
-						-		
-	43.5					-		
-	44.2	9.0	S17SS	32-50/3 (50/3")	wet, fine to medium grained, trace micas, part weathered rock	ially		wet spoon
45 176.2						_		
-						-		
						-		
	48.5 48.8					-		
-	40.0	10.0	S18SS,	36-50/4 (50/4")	very fine to medium grained	-		spoon dry
50 71.2_								
_						-		
_						-		
_	53.5 53.8					-		
	00.0	3.0	<u>S19SS</u> ,	50/3 (50/3")	brown, fine to medium grained	-	<u> </u>	: Grinding below 55'
55 <u> </u>							<b> </b>	
_						-	<b>!</b> !!!	]
-						-	<b> </b>	
_	58.5 58.8	4.0	00000	50/4		-		
-		4.0	<u>S20SS</u>	50/4 \(50/4")/		-		
60_								



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# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463104.3 N, 1281523.3 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVFI S	S : 35 3 ft		ound surface	START : 2/22/07 09:30	END : 2/23		11:30 LOGGER : R. Calimer
			GRADE (ft)		SOIL DESCRIPTION	,,D/_C		COMMENTS
	INTERV		, ,	STANDARD PENETRATION TEST RESULTS			TOG	
		RECOVE	EDV (in)	TEST RESULTS			CIC	DEPTH OF CASING, DRILLING RATE,
		RECOVI		0" 0" 0"	MOISTURE CONTENT, RELATIVE DEN CONSISTENCY, SOIL STRUCTURE, MIN	ISITY OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	CONSISTENST, SOIL STRUCTURE, WIIIV	ILI VALOGI	SYN	INGTROMENTATION
161.2				,	Silty Sand* (SM)		.111	
					brown, wet, very dense, fine to medium gra	ined, highly		
1 -					weathered rock fragments	-	<b>.</b>	
						_	[]]	
1 ]						-	]	1
-	63: <del>5</del>	2.0	\S21SS/	50/2		-	<b>!</b> ]][	
			(02100)	(50/2")		<del>-</del>		
65_							<b>]</b>	-
156.2						-	<b>!</b>	:
						-	<b>1</b>	-[
]						-	<b>!</b> !	]
						-	<b> </b>	
	68.5 68.6						1	1
1 ]	68.6	3.0	\S22SS/	50/3	Begin Rock Coring at 68.6 ft below ground See the next sheet for the rock core log	surface _	Γ	Auger refusal at 68.6 ft
70				(50/3")	See the next sheet for the rock core log	-	1	
70 <u> </u>							1	-
-						-		
-						-	1	
						_	1	
_						-	1	
-						-	1	
1 ]						_	1	
75 <u> </u>							-	-
140.2						-	1	
]						=	1	
-						-	ł	
-						-	1	
1 ]						_		
<b>I</b> ⊢						-	1	
80						-	1	
141.2							1	1
						-	1	
						<u>-</u>	1	
]						-	1	
<b>I</b> ⊢						-	1	
						-	1	
						_	1	
85 <u> </u>						_	1	-
····						-	1	
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90						_	1	
							T	
							1	



PROJECT NUMBER: **BORING NUMBER:** 339179.RD.FI

**BH-08** 

SHEET 4 OF 4

#### **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463104.3 N, 1281523.3 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD: ATV, CME 55, NQ size double tube core barrel ORIENTATION: Vertical WATER LEVELS: 35.3 ft below ground surface START: 2/22/07 09:30 END: 2/23/07 11:30 LOGGER: R. Calimer LITHOLOGY DISCONTINUITIES **COMMENTS** CORE RUN, LENGTH, AND RECOVERY (%) MO) FRACTURES PER FOOT DESCRIPTION ROCK TYPE COLOR DEPTH BEL SURFACE (f SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD 2 MINERALOGY, TEXTURE % DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS SYMBOL WEATHERING, HARDNESS, RQD( AND ROCK MASS DROPS, TEST RESULTS, ETC. CHARACTERISTICS light gray water return 2 Min 22 Sec /ft Fracture, medium rough, grayish brown staining, very thin to no infilling, moderately R1NQ Gneiss\* 3 47 light gray, (10YR 7/2), fine to medium 16ft 70 grained, slightly weathered, medium 99% 2 dipping 1 Min 30 Sec /ft 70.2 151.2 soft to hard, close spacing, 1 Min 39 Sec /ft 2 1 Min 52 Sec /ft 4 R2NQ medium rough, reddish brown staining, gently yellowish brown, (10YR 5/6), medium 1 Min 54 Sec /ft 5 ft 33 4 to very stepely dipping grained, very soft to soft, highly 100% weathered, close spacing, crumble in 2 Min 18 Sec /ft 5 hand from 72.25' to 73.25' 1 Min 53 Sec /ft 3 75 75.2 146.2 2 Min /ft 2 light bluish gray, (GLEY 2 7/1 10B), 1 Min 51 Sec /ft, UCS = 3 fresh to slightly weathered 7575 psi R3NQ 2 Min 20 Sec /ft 5 ft 77 1 100% 2 Min 6 Sec /ft 2 2 Min 58 Sec /ft 1 141.2 80.2 80 2 Min 17 Sec /ft very hard 2 R4NQ 3 Min 14 Sec /ft 0 3.2 ft 83 99% 5 Min 7 Sec /ft 4 83.4 3 Min 10 Sec /ft 6 1 Min 52 Sec /ft 85 2 136.2 2 Min 30 Sec /ft R5NQ 0 5 ft 75 2 Min 21 Sec /ft 100% 1 2 Min 48 Sec /ft 2 88.4 Bottom of Boring at 88.4 ft below ground surface on 2/22/07 15:30 1. Water 35'4", cave in 56'4" 90 on 2/23/2007 14:30 131.2 95 126.2



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SHEET 1 OF 4

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463148.1 N, 1281528.4 E)

ELEVATION: 220.0 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

DRILLING EQUIPMENT AND METHOD: ATV, CME 55, 2-1/4" ID HSA, 140 lb hammer with cathead, 2" OD Split Spoon

WATER LEVELS: 34.0 ft below ground surface START: 2/20/07 12:25 END: 2/21/07 14:00 LOGGER: R. Calimer DEPTH BELOW EXISTING GRADE (ff) SOIL DESCRIPTION COMMENTS STANDARD PENETRATION INTERVAL (ft) TEST RESULTS SYMBOLIC SOIL NAME, USCS GROUP SYMBOL, COLOR DEPTH OF CASING, DRILLING RATE, RECOVERY (in) MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION #TYPE 6"-6"-6' (N) 220.0 PP=0.75 tsf Silt \* (ML) 5.0 S1SS 1-2 1.0 brown, moist, soft, low plasticity, trace sand, trace organics, trace mica (fill) 7.0 S2SS 1-2 2.0 medium plasticity, some clay PP=10 tsf 10.0 S3SS 1-2 3.0 PP=1.5 tsf 12.0 S4SS 2-4 4.0 Sand \* (SP) PP=1.75 tsf 12.0 S5SS 2-7 5.0 gray and brown, moist, medium dense, medium grinding 215.0 grained, some rock fragments (fill) 11.0 S6SS 11-9 6.0 Clayey Sand \* (SC) 12.0 S7SS 19-25 red brown, moist, very dense, low to medium plasticity, 5.0 S8SS 50/5 trace brick and glass, 1.5' chunck of cement. Blue gray PP=3.25 tsf rock, 6.5-8' (fill) 8.0 (50/5")Silty Sand (SM) PP=2.0 tsf 10.0 S9SS 3-3 9.0 brown gray red, moist, loose to very dense, nonplastic, PP=0.75 tsf trace rock, brick, slag, asphalt-black staining (fill) S10SS 10 6.0 9-9 210.0 10.5 13.5 blackish gray, very dense, trace concrete fragments, PP=1.75 tsf 7-12-50/5 8.0 **S11SS** gravel=29%, sand=40.8%, fines=30.2% brick at 14.5 (62/11")14.9 15 205.0 Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO) check. UXO check was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO interference was detected. No elevated Photo Ionisation Detector (PID) 18.5 readings. light gray, dry, very dense, nonplastic, weathered rock 27-39-12 S12SS 11.0 fragments (51)20.0 20 200.023.5 Sandy Silt \* (ML) switch to 3.25in Augers 4-6-9 11.0 S13SS tan brown, moist, stiff to very stiff, fine to medium PP=2.0 tsf (15)25 grained, nonplastic, trace micas 25.0 195.0 28.5 Silty Sand\* (SM) PP=1 0 tsf 12-16-22 **S14SS** 14.0 tan brown, moist, dense, trace rock fragments (breaks, non-cohesive) (38)30 30.0



PROJECT NUMBER:	BORING NUMBER
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339179.RD.FI

**BH-09** 

SHEET 2 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463148.1 N, 1281528.4 E)

ELEVATION: 220.0 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	3 : 34.0 ft	below gr	ound surface	START : 2/20/07 12:25	END : 2/21	/07	14:00 LOGGER : R. Calimer
			GRADE (ft)	STANDARD PENETRATION	SOIL DESCRIPTION		Ð	COMMENTS
	INTERV	AL (ft)		PENETRATION TEST RESULTS		_	3.00	
		RECOVE	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLC MOISTURE CONTENT, RELATIVE DENSITY	OR, OR	OLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERAL	.OGY	SYMBOLIC LOG	INSTRUMENTATION
190.0				(14)	Silty Sand* (SM)		 ]]]}	<u> </u>
_					tan brown, moist, dense, trace rock fragments	_		1
-						-		
-						_		
-	33.5					-		1
-	00.0			12-17-25		_		
35	35.0	15.0	S15SS	(42)		_		
185.0	00.0							-
_						_		1
_						-		1
]						=	[] }	1
-	38.5					=		
_		16.0	S16SS	18-30-50/4	Silty Sand* (SM)			Wet spoon
40	39.8	10.0	31033	(80/10")	tan brown, wet, very dense, very fine to fine grain- partially weathered rock	ed,		PP=1.75 tsf
180.0					partially meanlered resid			-
-						_		1
							$ \cdot \cdot $	1
_						_		
-	43.5 43.9					-		1
	43.9	5.0	S17SS	50/5		_	$[\cdot]$	PP=1.75 tsf
45				(50/5")		_		
175.0								<u> </u>
-						=	HII.	
_						_		1
-						-		1
	48.5 48.8							
_	40.0	4.0	S18SS	50/4 (50/4")		_	:  }	
50 -				(50/4)		-		
170.0						_		_
-						-		<u> </u>
_						_		
-						-		
	53: <del>5</del>					_		1
-	55.1	3.0	<u>S19SS</u> /	50/3 (50/3")		-	[][]	Grinding from 55-60'
55 <u></u> 165.0				(00/0 )		_	$ \cdot \cdot $	_
165.0_						_		1
_						-		1
] -						=		1
-						=		]
	58. <del>5</del>		00000	F0/0				
-			S20SS	50/2 (50/2")	fine to medium grained, some gneiss rock fragme	ents _	[[]]	1
60_				\		_	Ш	
1								



PROJECT NUMBER:	ORING NUMBER:

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SHEET 3 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463148.1 N, 1281528.4 E)

ELEVATION: 220.0 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/20/07 12:25	END : 2/21		14:00 LOGGER : R. Calimer
			RADE (ft)		SOIL DESCRIPTION	LINU . ZIZ		COMMENTS
		TERVAL (ft)		STANDARD PENETRATION TEST RESULTS	23.2.2.2.3		.0G	22
	INTERV			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL,	COLOR.	IC L	DEPTH OF CASING, DRILLING RATE,
		RECOVE			MOISTURE CONTENT, RELATIVE DEN CONSISTENCY, SOIL STRUCTURE, MIN	BOL	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MIN	ERALOGY	SYMBOLIC LOG	INSTRUMENTATION
160.0				(1.1)				Auger refusal at 61 ft
1 1	61.0				B : B   0 : 1010 #		Ш	
-					Begin Rock Coring at 61.0 ft below ground See the next sheet for the rock core log	зипасе _		
					eed ale new enesties ale reek eele leg	_		
_						-		
-						-		
						_		
65_ 155.0								-
						_		
1 7						-		
1 +						-		
1 1						_		
1 -						=		
-						-		
70 <u> </u>								_
150.0_						-		
						_		
-						-		
						_		
1 7						_		
-						-		
75								_
145.0_						=		
						_		
-						-		
_						-		
1 ]						_		
_						-		
80								<u>_</u>
140.0								
1 -						-		
						_		
-						-		
						_		
						-		
85						-		
85 <u></u> 135.0								
1 -						-		
1 1						_		
1 ]						_		
1 -						=		
1 1						_		
90						-		
30								



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SHEET 4 OF 4

#### **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463148.1 N, 1281528.4 E)

ELEVATION: 220.0 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD: ATV, CME 55, NQ size double tube core barrel ORIENTATION: Vertical WATER LEVELS: 34.0 ft below ground surface START: 2/20/07 12:25 END: 2/21/07 14:00 LOGGER: R. Calimer DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) LOW (f) FRACTURES PER FOOT DESCRIPTION ROCK TYPE COLOR DEPTH BELO SURFACE (f SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Medium rough, flat to gently dipping, wide Gneiss \* 2 Min 16 Sec /ft 10+ separation, clean to stained dark yellowish brown, (10YR 4/4), very soft to soft, medium grained, highly 1 Min 34 Sec /ft 10+ R1NQ weathered, close to very close spacing 0 4.3 ft 1 Min 47 Sec /ft 54% 1 Min 53 Sec /ft 65 155.0 65.3 1 Min 25 Sec /ft 10 1 Min 28 Sec /ft, UCS = 1 10663 psi R2NQ 1 Min 28 Sec /ft 10+ 5 ft 40 105% 10 1 Min 32 Sec /ft Medium rough, gently to medium dipping light gray, (GLEY 7N), very hard to narrow to wide separation, clean to stained hard, fine to medium grained, slightly 1 Min 13 Sec /ft 70 1 weathered, close spacing, 150.0 70.3  $\frac{\times}{3}$ 1 R3NQ 5 ft 68 2 93% 2 Min 30 Sec /ft 1 1 Min 25 Sec /ft 145.0 75.3 R4NQ 76.3 \117% 2 92 Bottom of Boring at 76.3 ft below 1. Water was at 35' bgs after augers pulled out, cave in at 59.8' bgs on 2/22/07 ground surface on 2/21/07 14:00 09:00 2. Water was at 34' bgs and cave in at 52' bgs on 2/23/07 10:00 140.0 85 135.0 90 130.0



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SHEET 1 OF 3

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463042.8 N, 1281579.1 E)

ELEVATION: 223.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START: 2/8/07 08:30 END:			9:05 LOGGER : R. Calimer	
			GRADE (ft)	STANDARD	SOIL DESCRIPTION		ۍ ت	COMMENTS	
	INTERV			PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		CLO	DEPTH OF CASING, DRILLING RATE,	
		RECOVI	ERY (in) #TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
223.8	0.0			(N)	Cik* (MI)	×	δ	nn=0.75 tol. framen	
223.6	1.0	7.0	S1SS	2-2	Silt * (ML) Brown, moist, soft, nonplastic, trace organics, little clay	<u> </u>	$\otimes$	pp=2.75 tsf, frozen	
-	2.0	11.0	S2SS	2-2	(fill)	1	$\bowtie$	PP=1.5 tsf	
_	3.0	12.0	S3SS	2-2	gray brown, low plasticity		$\otimes$	PP=1.0 tsf	
_	4.0	9.0	S4SS	2-4	1" gravel at 4'		$\boxtimes$	PP=0.25-1.75 tsf	
5_	5.0	7.0	S5SS	1-1	Clayey Silt * (ML) gray brown, moist, medium stiff, medium plasticity, trace	e	$\otimes$	PP=0.75 tsf	_
218.8	6.0	12.0	S6SS	3-8	sand, trace mica, quartzite gravels from 5.5-6' (fill) gray brown, low plasticity, trace mica		$\boxtimes$	PP=2.75 tsf	
1	7.0	12.0	S7SS	7-6	Sandy Silt * (ML) gray brown, moist, fine to medium grained sand	<u>*</u>	$\otimes$	PP=0.5 tsf grinding 6'	
7	8.0	11.0	S8SS	5-4	grained, low to non plasticity, few quartzite rock fragments, trace mica, trace red brick(fill)	-	$\otimes$	PP=1.75 tsf	
7	9.0	11.0	S9SS	4-4	• •	7	$\otimes$	PP=0.5 tsf	
10		14.0	S10SS	4-7-6		7	$\otimes$		
213.8	10.5			(13)	Orange brown, stiff, very fine to fine grained, nonplastic		$\langle\!\!\langle\!\! $	Note: Split spoon was sampled every 1 ft for	_
1					Grange blown, sain, very line to line grained, nonplastic		$\otimes$	top 10 ft due to Unexploded Ordnance (UXO) check. UXO check was performed every 1 ft	
=						*	$\otimes$	from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO interference was detected. No	
=	13.5				and divers shiff abount of accepta		$\bowtie$	elevated Photo Ionisation Detector (PID) readings.	
45	45.0	5.0	S11SS	2-2-5 (7)	medium stiff, chunk of concrete , tile at 15 ft	1	$\otimes$	reaumys.	
15 <u> </u>	15.0						$\otimes$		-
						1	$\otimes$		
=						1	$\otimes$		
1	18.5					1	$\otimes$		
		18.0	S12SS	2-2-4 (6)	few clay	<u>*</u>	$\otimes$		
20 203.8	20.0			(0)		$ \stackrel{\circ}{\mathbb{X}}$	$\otimes$		-
7						-	$\otimes$		
7						7	$\otimes$		
=	23.5					<b>1</b>	$\otimes$		
‡	20.0	12.0	S13SS	9-14-11	Silty Sand (SM) Yellow brown to gray brown, moist, medium dense, fine		$\bowtie$	gravel=4.5% sand=60.3%	
25 <u> </u>	25.0	12.0	0.000	(25)	to coarse grained, nonplastic, trace mica, trace gravel/cobbels, layer of black slags (fill)		$\otimes$	fines=35.1%	_
-					grave roubbols, layer or black slags (IIII)	1	$\otimes$		
=						1	$\otimes$		
4	00.5					1	$\otimes$		
_	28.5	44.0	04:05	2-3-5	Clayey Silt * (ML)	$\dashv$		PP=1.25-1.75 tsf	
30	30.0	14.0	S14SS	(8)	Gray brown, moist, medium stiff to stiff, low plasticity, trace rock fragments, few fine sands (possible fill)	$\perp$		LL=29 , PL=23 , PI=6	
							1		



PROJECT NUMBER:	BORING NUMBER:

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SHEET 2 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463042.8 N, 1281579.1 E)

ELEVATION: 223.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/8/07 08:30	END : 2/12			er
			GRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS	
1	INTERV	AL (ft)		PENETRATION TEST RESULTS			١ö		
	RECOVERY (in)		IESI KESULIS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		CLC	DEPTH OF CASING, DRILLING RATE	.,	
			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENS CONSISTENCY, SOIL STRUCTURE, MINE		SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	,
193.8				(N)	Clayey Silt * (ML)		(y		
_					Gray brown, moist, medium stiff to stiff, low pl trace rock fragments, few fine sands (possible	lasticity,	1		
-					trace rock tragments, lew line sands (possible	=     ) _	╢╢		-
_						-	1111		4
-	33.5					-	1		-
		9.0	S15SS	14-25-40	Silty Sand * (SM) Orange brown, moist, very dense, fine to med	lium -			1
35_	35.0	9.0	31333	(65)	grained, trace rock fragments, trace micas, pa			<u>:</u>	
188.8_					weathered rock	-		<u>.</u>	-
_						-	1	<b> ·]</b>	
] -						-			4
						-	1]]]		
-	38.5			40.05.55	wet, few gneiss gravels	-		<b>[</b>	-
		12.0	S16SS	19-33-38 (71)	, g gravolo	-	1		
40 <u> </u>	40.0			(* ')				j. <b>i</b>	
						-	<b>!</b>	:	
-						-		<b>:</b>	-
_						-	1		1
-	43.5					-	[]]		-
_	44.5	12.0	S17SS	11-50/6	few micas	-		<u> </u>	4
45_	44.5					_	<b> </b>		
178.8_								].	_
_						-			_
-						-		<u> </u>	-
_						-	<b>!</b>	<u>l:</u>	
-	48: <del>5</del>	3.0	\S18SS/	50/3		-	$\  \ $	PP=1.0 tsf	-
50 -		0.0	(0.000)	(50/3")		-	1	(breaks)	1
50 <u> </u>						_	[]]]	:	
						-	1:11	<b>:</b> ]	1
1 -						-	<u> </u>	<u>[</u>	-
[ ]						-		Į. <b>1</b>	1
	53.5					-		:	
] -			\ <u>S19SS</u> /	50/1 (50/1")		-		[ <b>: </b>	7
55 <u> </u>				(00/1)		_	1	<u>l:</u>	_
168.8_						-	111	<b> ·</b>	-
						-	1	<u>[.</u>	
-						-		:	-
	58.0				Desire Deals Opins at 50.0 %	-		<u> </u>	
-					Begin Rock Coring at 58.0 ft below ground su See the next sheet for the rock core log	ınace _	1		-
60						-	1		4
60_							$\vdash$		



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SHEET 3 OF 3

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463042.8 N, 1281579.1 E)

ELEVATION: 223.8 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel

ORIENTATION : Vertical

COMING	J LQUII WILLY	II AN	D IVIL	THOD: ATV, CME 55, NQ size double tube core barre	:1		ORIENTATION : Vertical
WATER	LEVELS: 34	1.3 ft b	oelow	ground surface START : 2/8/07 08:	30	END : 2/12/07 09:05	LOGGER : R. Calimer
≥	<u> </u>			DISCONTINUITIES	õ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
20 20		ď	E E	THICKNESS, SURFACE STAINING, AND TIGHTNESS	S	CHARACTERISTICS	, , , , , , , , , , , , , , , , , , ,
60_ 163.8_	81NQ 2.4 ft 101%	35	6 10+	Fractures, horizontal and vertical, medium rough, red brown to orange brown staining in fractures		Gneiss * medium to coarse grained, slightly weathered, very pale brown (10YR 8/2) when it was wet, light gray (5 Y7/1) when it was dry, spickeled black,	2 Min 12 Sec /ft 2 Min 42 Sec /ft  2 Min 5 Sec /ft
-			3 10+	Fractures, horizontal		soft to medium soft.	3 Min 22 Sec /ft
-	R2NQ 5 ft 90%	62	1			-	3 Min 5 Sec /ft
65_ 158.8			2 × <del>1</del> ×	-		very dark graish brown, (10YR 3/2), soft	3 Min 45 Sec /ft, UCS = 3520 psi 4 Min 38 Sec /ft
-			4 2	Fractures, 60 deg and 75 deg		- - -	=
-	R3NQ 5 ft 90%	60	4				-
70_ 153.8_	70.4		***	-		- - -	- -
	R4NQ		1			-	4 Min 50 Sec /ft
-	5 ft 105%	90	2			-	5 Min 16 Sec /ft 4 Min 56 Sec /ft
75 <u></u> 148.8_	75.4		3	-		_ _ -	5 Min 56 Sec /ft  3 Min 46 Sec /ft
	R5NQ 2.6 ft 96%	42	3			- - -	3 Min 58 Sec /ft
80 - 143.8 - - - - - - 85 - 138.8 - -	78.0			Fractures, 75 deg and 85 deg		Bottom of Boring at 78.0 ft below ground surface on 2/12/07 09:05	Note: 1.water at 34.3' 2/9/07 , 08:20 2. Cave in at 54'8 2/12/07 water at 54'7" bgs 14:00 3. Cave in at 60'4 2/13/07 water at 34'9, 07:50



PROJECT NUMBER: BORING NUMBER: 339179.RD.FI

**BH-11** 

SHEET 1 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463095.8 N, 1281588.0 E)

ELEVATION: 223.3 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/12/07 14:39 ENI	ID : 2/16/		2:00 LOGGER : R. Calimer	
			GRADE (ft)		SOIL DESCRIPTION			COMMENTS	П
	INTERV		, ,	PENETRATION			LOG		_
		RECOVE	-RY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	_	CIC	DEPTH OF CASING, DRILLING RATE,	
		00	#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOG	SY	SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
			#IIFL	(N)			S		
223.3_	0.0	10.0	S1SS	3-3	Silt * (ML)	>	$\otimes$	PP=0.75-1.0 tsf	$\Box$
-	1.0	11.0	S2SS	2-3	brown, moist, medium stiff, low to non plasticity, trace organics (fill)		$\otimes$	PP=1.25-1.5 tsf	-
_	2.0				soft, low plasticity, trace micas low to medium plasticity, red & gray staining at 4.5'	<b>-</b> ₹	XX	PP=0.25 tsf	4
_	3.0	4.0	S3SS	2-2	low to medium plasticity, red & gray staining at 4.5	_‡	$\otimes$	11 -0.23 (3)	
_	4.0	9.0	S4SS	2-2			$\otimes$		-
		12.0	SSSS	2-2		1	$\bowtie$		1
5 218.3	5.0	12.0	S6SS	2-3		— <u>K</u>	$\bowtie$	PP=0.75 tsf	-
_	6.0	12.0	3033	2-3			$\bowtie$		7
_	7.0						$\bigotimes$		
] -	8.0	12.0	S7SS	5-7	Silty Sand * (SM) tan brown, moist, medium dense, fine to medium	-	$\otimes$	PP=1.75 tsf	-
1 -		7.0	S8SS	6-6	grained, nonplastic, skipped 6-7' sample	<b>1</b>	$\otimes$		
-	9.0	7.0	0000		trace rock fragments, trace clays red, trace rock fragments, trace clays (fill)	+	$\bowtie$	PP=2.0 tsf	-
10_	40.5	9.0	S9SS	4-6-7 (13)	.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		$\bowtie$		_
213.3_	10.5			. ,		-[6]	$\bowtie$	grinding at 10' Note: Split spoon was sampled every 1 ft for	-
-						7	$\otimes$	top 10 ft due to Unexploded Ordnance (UXO)	_
-							X	check. UXO was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO	-
-	40.5					<b>-</b>	XX	interference was detected. No elevated Photo lonisation Detector (PID) readings.	4
-	13.5			0.5.5	gray brown	- ★	$\bowtie$	ionisation Detector (PID) readings.	-
15	15.0	12.0	S6SS	6-5-5 (10)		78	$\otimes$		_
208.3	15.0						XX		
_							$\otimes$		-
_							$\otimes$		1
-						-[6	$\bowtie$		-
_	18.5						$\bigotimes$		1
-		12.0	S7SS	3-4-4	Clayey Silt * (ML) tan brown, moist, medium stiff, trace sand & rock		$\otimes$	PP=4.5 tsf	-
20 <u></u> 203.3	20.0			(8)	fragments (fill)		$\bowtie$	LL=27, PL=18, PI=9	_
203.3_						-[8	$\otimes$		-
						<b>-</b>	$\otimes$		1
-						-[3	$\bowtie$		-
1 7	82 E					7	$\otimes$		4
-	23.5	0.0	S8SS.	50/1	no recovery		$\bowtie$		-
25_				(50/1")	•	7	$\otimes$		4
198.3						<u> </u>	$\otimes$		$\exists$
-							$\bowtie$		-
1 -						<b>1</b>	$\bigotimes$		1
-						- 2	$\otimes$		-
1 -	28.5						$\bowtie$		1
-		9.0	S9SS	17-28-34	Silty Sand * (SM) light yellowish brown, dry, very dense, fine to mediun	<sub>m</sub> -[:			-
30	30.0	0.0	0000	(62)	grained, trace coarse sands, a lot of mica	···			



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SHEET 2 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463095.8 N, 1281588.0 E)

ELEVATION: 223.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER LEVELS: 35.3 ft below ground surface					START : 2/12/07 14:39 END : 2/16/07				
DEPTH E	DEPTH BELOW EXISTING GRADE (ft) STANDARD				SOIL DESCRIPTION		စ္ခ	COMMENTS	
	INTERVA	AL (ft) RECOVE	ERY (in) #TYPE	PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR MOISTURE CONTENT, RELATIVE DENSITY O CONSISTENCY, SOIL STRUCTURE, MINERALO	R, PR PGY	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
193.3_ - - - - - - - - - - - - - - - - - - -	33.5 34.6 38.5 39.0	14.0	\$10S\$	47.45.504	Silty Sand * (SM) light yellowish brown, dry, very dense, fine to media grained, trace coarse sands, a lot of mica, partially weathered rock  slightly moist			- - - - - - - - - - - - - - - - - - -	
40 - 183.3	43:5	4.0	<u>(\$16SS</u> )	50/4 \(50/4")/	trace small gravel (1/4" diameter) , subrounded, saturated				
50 - 173.3 - - -	48.5 48.5	3.0	<u>(\$17\$\$</u> ,	50/3 \(50/3")/	dry, fine grained	- - - - - - - - - - - - - - - - - - -		- - - - - - - - - - -	
55_ 168.3_ - - - -	58.6		\S18SS/ \S19SS/	50/2 (50/2") /	moist, pieces of weathered bed rock ( 1" diameter )				
60		\U.U/	(31333)	50/1") (50/1")	No recovery	-			



PROJECT NUMBER:	PROJECT NUMBER:	BORING NUMBER
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SHEET 3 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463095.8 N, 1281588.0 E)

ELEVATION: 223.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 2/12/07 14:39	END : 2/16		
		XISTING G			SOIL DESCRIPTION	LIND . Z/ I		COMMENTS
1	INTERV		( )	STANDARD PENETRATION TEST RESULTS			SYMBOLIC LOG	-
			-DV (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, O	COLOR,	$\frac{1}{2}$	DEPTH OF CASING, DRILLING RATE,
		RECOVE		011 011 011	MOISTURE CONTENT, RELATIVE DENS CONSISTENCY, SOIL STRUCTURE, MINE	SITY OR	/BO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	CONSISTENCE, SOIL STRUCTURE, WINE	LIVALOGI	SYN	INGTROMENTATION
163.3_				·	Silty Sand * (SM)			
-					light brown, chunks of weathered bed rock, s mica rich, fine sand	saturated, _		
-					mica non, iine sand	-		-
-						_	$ \cdot \cdot $	
-	63.5					-		
-	99:9	1.0	\S20SS/	50/1		<del>-</del>	<b>!</b>	
65				(50/1")		-		
158.3	65.8						<b>!</b>	Auger refusal at 65.8 ft bgs
-	00.0				Begin Rock Coring at 65.8 ft below around s	urface	<b>∤</b> ⊞	r. <u> </u>
-				ļ	Begin Rock Coring at 65.8 ft below ground s See the next sheet for the rock core log	-	1	
1 -				ļ		-	1	
-						-	1	
-						_	1	
70 -						-	1	
70 <u> </u>							1	
-						-	-	
						-	1	
-						=	1	
-						_	1	-
-						-	1	
75						=	1	-
148.3							1	
-						-	1	
						<del>-</del>	1	
-						-	-	-
1 -						-	1	
-						_	1	
80_						-	1	
143.3				ļ			1	Ī
-						-	1	
-						-	1	
1 -						-	1	
1 -						-	1	
-						-	1	
85_				ļ			1	
138.3						_	1	
-						-	1	
] -				ļ		-	1	
-						-	1	
] -				ļ		-	1	
-						-	1	
90_						<del>-</del>	1_	
							1	



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SHEET 4 OF 4

#### **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463095.8 N, 1281588.0 E)

ELEVATION: 223.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD: ATV, CME 55, NQ size double tube core barrel ORIENTATION: Vertical WATER LEVELS: 35.3 ft below ground surface START: 2/12/07 14:39 END: 2/16/07 12:00 LOGGER: R. Calimer DISCONTINUITIES LITHOLOGY COMMENTS CORE RUN, LENGTH, AND RECOVERY (%) LOW (f) FRACTURES PER FOOT DESCRIPTION ROCK TYPE, COLOR, DEPTH BELO SURFACE (f SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD SYMBOLIC MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS RQD(%) DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS DROPS, TEST RESULTS, ETC. CHARACTERISTICS Fractures, 45 deg, rough, brown to reddish Gneiss \* 4 Min 53 Sec /ft 4 brown staining, medium rough light gray, (5Y 7/2), medium grained, moderately weathered, speckled dark 4 Min 47 Sec /ft 4 gray & black, soft to medium soft R1NQ 4 Min 26 Sec /ft 5 ft 30 5 90% 3 Min 11 Sec /ft 5 3 Min 39 Sec /ft light greenish gray, (Gley 1 7/1 10Y), hard, slightly weathered 153.3 70.8 3 3 Min 50 Sec /ft 4 R2NQ 3 Min 35 Sec /ft 5 ft 60 1 103% 3 Min 12 Sec /ft 3 3 Min 29 Sec /ft 148.3 0 75.8 4 3 Min 55 Sec /ft, UCS = 2 7548 psi R3NQ 3 Min 32 Sec /ft 73 4 5 ft 103% 3 Min 47 Sec /ft 3 80 3 Min 0 Sec /ft 143.3 2 80.8 Bottom of Boring at 80.8 ft below Note: ground surface on 2/16/07 12:00 1. 2/16/07 water at 34'6" after augers pulled out, cave in at 66'2" 2. 2/19/07 water at 35'4", cave in at 56' 85 138.3 90 133.3 95 128.3



PROJECT NUMBER: 339179.RD.FI

BORING NUMBER: BH-12

SHEET 1 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463134.6 N, 1281588.0 E)

ELEVATION: 222.1 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	: 35.6 ft	below gr	ound surface	START : 2/19/07 13:00 E	ND : 2/20	)/07 (	08:20 LOGGER : R. Calimer	
DEPTH B	BELOW E	XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION		G	COMMENTS	
	INTERV	AL (ft)		PENETRATION TEST RESULTS		,	ССО	DEPTH OF CASING, DRILLING RATE,	
		RECOVE	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLOF MOISTURE CONTENT, RELATIVE DENSITY O	DR	30LI(	DRILLING FLUID LOSS, TESTS, AND	
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALC	OGY	SYMBOLIC LOG	INSTRUMENTATION	
222.1_	0.0 1.0	7.0	S1SS	2-3	Silt * (ML) brown, moist, soft, low plasticity, trace sand, trace	_	$\otimes$	PP=0 tsf	
	2.0	9.0	S2SS	2-2	gravels, trace micas (fill)	_	$\bowtie$		
	3.0	8.0	S3SS	1-2		-	$\otimes$	PP=0.5 tsf	
†	4.0	10.0	S4SS	2-1	very stiff, trace brick fragments	-	$\bowtie$		
5	5.0	10.0	S5SS	1-2	Clayey Silt * (ML) gray brown, moist, soft, low to medium plasticity, tr	ace _			
217.1	6.0	12.0	S6SS	1-3	fine sand, trace micas, Limestone rock at 6.5' (fill)		$\otimes$	PP=0 tsf	
1	7.0	12.0	S7SS	5-7	Sandy Silt * (ML)		$\overset{\otimes}{\otimes}$	PP=1.25-2.25 tsf	
	8.0	9.0	S8SS	5-6	tan brown, moist, stiff, nonplastic, trace rock fragm (fill)	ents _			
†	9.0	9.0	S9SS	8-8	very stiff, trace brick fragments	_	$\bowtie$		
10	3.0	13.0	S10SS	4-7-8		_	$\bowtie$	PP=0.75-2.75 tsf, grinding	
212.1	10.5	15.0	01000	(15)			$\bowtie$	Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO)	
- -						_	$\bowtie$	check. UXO was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO	
_						-	$\bowtie$	interference was detected. No elevated Photo Ionisation Detector (PID) readings.	
	13.5				have a till for any life and any life and		$\bowtie$	. , ,	
- 15	45.0	10.0	S11SS	3-5-5 (10)	brown, stiff, few rock fragments and wood fragmer trace micas	nts, _ -	$\bowtie$	PP=1.0 tsf moisture content = 1.6%	
207.1	15.0					_	$\bowtie$	organic content =1.9%	
_						-	$\bowtie$		
_						-	$\bowtie$		
_	18.5				011	_	$\bigotimes$		
-		13.0	S12SS	6-7-7 (14)	Silty Sand * (SM) tan brown, moist, medium dense, fine to medium			Chloride=14 ppm, pH=8.09, Resistivity=9150 ohm-cm, Sulfate=58 ppm.	
20 202.1	20.0			( ,	grained, nonplastic, few micas, trace rock fragmen	its		<del>-</del>	
_						-			
_						-			
=	23.5					_			
		14.0	S13SS	8-10-13 (23)	very fine sand & silt	-		Switch to 3.25"Augers	
25 197.1_	25.0			(20)		_		<del>-</del>	
=						-			
]						-			
-	28.5					-			
7		18.0	S14SS	10-31-45	light brown, dry, very dense	=			
30	30.0			(76)					



	PROJECT NUMBER: BORING
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SHEET 2 OF 4

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463134.6 N, 1281588.0 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	: 55, 2-1/4" ID HSA, 140 lb hammer with cathead, 2 START : 2/19/07 13:00	END : 2/20/		20 LOGGER : R. Calimer
			GRADE (ft)		SOIL DESCRIPTION			COMMENTS
	INTERV	AL (ft)		STANDARD PENETRATION TEST RESULTS			9 –	
		RECOVE	ERY (in)	TEST RESOLTS	SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSIT	LOR,	일	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINER	RALOGY	SYMBOLIC LOG	INSTRUMENTATION
192.1_					Silty Sand * (SM) tan brown, moist, medium dense, fine to mediu	ım.		
-					grained, few micas, trace rock fragments	"'''		
-						₹.		
_								
-	33.5					4:		
		18.0	S15SS	8-10-17 (27)				
35 <u> </u>	35.0			(21)			]	_
_								
-								
						1		
-	38.5 38.8					- -		
	38.8	10.0	S16SS	36-50/4	Silty Sand * (SM)	4		
40	-			\(50/4")/	tan brown, moist, very dense, fine to medium g partially weathered rock	grained,		
182.1						7		_
-						-		
_						1:		
-	-					+		
-	43.5 43.8	4.0	S17SS	50/4		].		
_		4.0	31733	(50/4")	fine to medium grained	<u> </u>		
45 <u> </u>								_
''''-	-					<u></u>		
-						4		
_						1		
-	48. <del>5</del>					4		
_	48:7	3.0	S18SS	50/3		1	· } <b> </b>	
50 -				(50/3")		4		
172.1_								-
-						-		
-	]					]		
-							$\cdot  \cdot $	
-	53: <del>5</del>	20	C1000	EUIO		1		
-		3.0	<u>(S19SS</u> )	50/3 (50/3")		+		
55_ 167.1_								_
'0'.1-								
1 -						7		
1 -								
-	58 5					1		
1 =	58.5 58.7	3.0	S20SS	50/2	wet, rock fragments		$\ \ $	
60				(50/2")		4		
							"	



PROJECT NUMBER: BORING NUMBER	PROJECT NUMBER:	BORING NUMBER
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SHEET 3 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463134.6 N, 1281588.0 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	55, 2-1/4" ID HSA, 140 lb hammer with cathead START : 2/19/07 13:00	END : 2/20		
			GRADE (ft)		SOIL DESCRIPTION	_1,0 . 2/2(		COMMENTS
	INTERV			STANDARD PENETRATION TEST RESULTS			Ιος	
		RECOVI	ERY (in)	ILOI NEOULIO	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINI	ERALOGY	SYMBOLIC LOG	INSTRUMENTATION
162.1				(N)	City Cond * (CM)		(V)	
102.1					Silty Sand * (SM) tan brown, wet, very dense, fine to medium or rock fragments, partially weathered rock	grained, _		1
-					rock fragments, partially weathered rock	-		1
-						_		
-	63.5					-		1
-	99:9	1.0	\S21SS/	50/1		-	<u>:</u>   }	
65	65.0			(50/1")		-		Auger refusal at 65 ft bgs.
157.1	00.0				Begin Rock Coring at 65.0 ft below ground s	surface _		
-					See the next sheet for the rock core log	-		
] -						-		
_						=	1	
-						-		
						-	1	
70_ 152.1_								-
-						-	1	
I -						-		
-						-		
_						-		
-						-	ł	
75 <u> </u>						_	1	_
147.1_						_		
_						-		
-						-		
-						-	ł	
-						-	1	
80						_		_
142.1								]
_						-		
-						-		
-						-	1	
-						-		
g <sub>5</sub> -						-		
85_ 137.1_								<u>-</u>
-						-		
_						-		
-						-		
-						-	1	
-						_		
90_								



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SHEET 4 OF 4

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463134.6 N, 1281588.0 E)

ELEVATION: 222.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel

ORIENTATION : Vertical

WATER_LEVELS 3, 6, it below round surface   START 2/1907 13:00   END 2/2007 62:00   LOGGER R. Cullmer   LOGGER R. Cullmer R. Cullmer   LOGGER R. Cullmer R. Cu					THOD . ATV, CIME 55, NQ SIZE double tube core barre			ORIENTATION: Vertical
Section   Description   Description   Section   Sectio	WATER		6.6 ft b	oelow		:00	END : 2/20/07 08:20	LOGGER : R. Calimer
157.1   158.1   109.	<b>§</b> _	<b>□</b> %.				9	LITHULUGY	COMMENTS
157.1   158.1   109.	DEPTH BELC SURFACE (ft)	CORE RUN, LENGTH, ANI RECOVERY (	Ø	FRACTURES PER FOOT	DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND	SYMBOLIC L	MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
RINO   100%   101   10					Fractures, slightly to medium, rough, steply	\(\)	Gneiss *	5 Min. 17 Sec /ft
State   100%   17   3   6   10   10   10   10   10   10   10							greenish gray, (Gley 1 6/1 10Y), medium grained, highly weathered to	1
10		5 ft	17	3				1
70 70 0 10 10 152.1		.0070		6			- -	1
R2ND 6 8 4 4 8 4 8 75.0	70 152_1	70.0			etains, moderately dipping, slightly rough		- 	
R2NO 5 ft 47.1	102.1_				Stall 15, Thoughter a tely dippling, Slightly Tough		_ 70-72 Highly weathered	1
R3NO			28	-				1
To   To   To   To   To   To   To   To	-		20	-			_ weathered -	2 Min. 35 Sec /ft
147.1 R3NO 5 ft 107% 75 6 2 3 stains, Slightly to moderately dipping, slightly rough, narrow rough, narrow rough, narrow stains, Slightly to moderately dipping, slightly rough, narrow rough, narrow stains, Slightly to moderately dipping, slightly rough, narrow rough, narrow stains, Slightly to moderately dipping, slightly to moderately dipping, slightly to moderately dipping, slightly to moderately dipping, slightly to slightly to moderately dipping, slightly to slightly slig	75	75.0		$\otimes$			- -	3 Min. 15 Sec /ft
R3NQ 5 th   107%   75     6     2	147.1			2			<del></del> - -	1
Solution	_	R3NO		1			- - -	1
3 Min. 15 Sec /ft   3 Min. 15 Sec /ft   3 Min. 15 Sec /ft   Note: 1. Water levels after auger pulled 2/20/07 11:00   3 46" bys cave-in 48"   2. Water was 357" bys on 2/21/07 07:30   cave-in 57"?"   990   132.T	-	5 ft	75				- -	1
80   80.0							- -	1
	142.1	00.0		XXX			Bottom of Boring at 80.0 ft below ground surface on 2/20/07 08:20	1. Water levels after auger pulled 2/20/07 11:00 34'6" bgs cave-in 48'6" 2. Water was 35'7" bgs on 2/21/07 07:30



339179.RD.FI BH

BH-13 SHEE

SHEET 1 OF 3

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (462988.1 N, 1281644.4 E)

ELEVATION: 222.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 3/9/07 08:15	ND : 3/12/		12:00 LOGGER : R. Calimer
			GRADE (ft)	STANDARD	SOIL DESCRIPTION	10 : 0/ 12/		COMMENTS
	INTERV	AL (ft)		PENETRATION			ρ	
		RECOVE	ERY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OF	,	)   	DEPTH OF CASING, DRILLING RATE,
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOG		SYMBOLIC LOG	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
222.3_	0.0 1.0	12.0	S1SS	2-3	Clayey Silt * (ML) brown, moist, stiff, fine grained, low plasticity, trace r	rock -	$\otimes$	PP=1.25 tsf
	2.0	10.0	S2SS	8-7	fragments, trace organics (fill)	3	$\otimes$	=
_	3.0	11.0	S3SS	7-9		_	$\bowtie$	<u>-</u>
_	4.0	12.0	S4SS	5-23			$\bowtie$	<u>-</u>
5_	5.0	10.0	S5SS	9-11	Silty Sand* (SM) brown, moist, fine to medium grained, low to non		$\bowtie$	<u>-</u>
217.3_	6.0	11.0	S6SS	10-8	plasticity, highly weathered, rock fragments at 5.5', to rock fragments & mica. (fill)	trace _	$\bowtie$	-
_	7.0	7.0	S7SS	8-5		1	$\bowtie$	Moisture content=16% Organic content =1.9%
-	8.0	3.0	S8SS	4-3	1" quartiz rock at 0'	-	$\otimes$	-
-	9.0	9.0	S9SS	3-3	1" quartiz rock at 9' medium stiff	\$	$\otimes$	- -
10 212.3	10.5	8.0	S10SS	4-3-3 (6)	medium suii	$\rightarrow$	$\otimes$	
_	10.0					-	$\bowtie$	Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO)
_						7	$\bowtie$	check. UXO was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO
_	13.5					7	$\bowtie$	interference was detected. No elevated Photo Ionisation Detector (PID) readings.
_		18.0	S11SS	7-10-13 (23)	gray brown, few rock fragments orange brown , few clay	-	$\overset{\times}{\otimes}$	PP=3.0 tsf
15_ 207.3_	15.0			(23)		-	$\otimes$	_
_						3	$\otimes$	=
_						_	$\bowtie$	<u>-</u>
_	18.5					_	$\bowtie$	<u> </u>
-		3.0	S12SS	3-4-4 (8)		1	$\bowtie$	Auger refusal at 17'9" bgs, possibly boulder was encountered
20 <u> </u>	20.0			(-)		_	$\bowtie$	Borehole was offset. The log is combination of
_						\$	$\otimes$	the original and the offset borehole.
-						\$	$\otimes$	- -
-	23.5				Conch. Cité * (MIL)		$\bigotimes$	- 
25 -	25.0	18.0	S13SS	3-8-20 (28)	Sandy Silt * (ML) brown, moist, very stiff, nonplastic			PP=1.75 Chloride=18 ppm, pH=6.02, Resistivity=8780 ohm-cm, Sulfate=51 ppm.
197.3	20.0					=		
						1		<u>-</u>
						1		-
	28.5				Silty Sand * (SM)	<del></del> ‡	Щ	- PP=0.25 tsf
30	30.0	18.0	S14SS	4-5-6 (11)	orange brown, moist, medium dense, very fine to medium grained, trace rock fragments and mica	†		-
	23.0				ggg		10 I I	



PROJECT NUMBER: BC	RING NUMBER:

339179.RD.FI BH-13

SHEET 2 OF 3

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (462988.1 N, 1281644.4 E)

ELEVATION: 222.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER L	LEVELS	: 32.4 ft	below gr	ound surface	START: 3/9/07 08:15 END:	3/12/	07	12:00 LOGGER : R. Calimer
DEPTH BE					SOIL DESCRIPTION		Ú	COMMENTS
<b>1</b> [	INTERVA	AL (ft)		STANDARD PENETRATION TEST RESULTS			ŏ	
		RECOVE	RY (in)	LOT KLOOL 18	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		MBC	INSTRUMENTATION
			#111 L	(N)			SY	
192.3_					Silty Sand * (SM)	7		_
					orange brown, moist, medium dense, very fine to medium grained, trace rock fragments, trace mica			-
					mediam grained, race rock ragments, race mica	- †:		_
						}:		
1 -	33.5					1		-
1 🛨	00.0			10-10-14	wet		Ш	-
]	0=0	12.0	S15SS	(24)		4	$\  \ $	_
35_ 187.3	35.0					$\dashv$	}	_
							:	
1 ]						- 1		_
1 -						∹	Ш	-
1 1						ţ		]
1 1	38.5	6.0	04600	50/6	Olle On at (OM)			-
$\mathbf{I}$	39.0	6.0	S16SS	50/6	Silty Sand* (SM) orange brown, wet, very dense, very fine to medium	ŀ		-
40					grained, partially weathered	ュ		<u>_</u>
182.3								-
-						⊢∃		-
1 1							<u>                                     </u>	]
1 4						- 4	]]]	_
-	43.5					- 1		-
	43.5 43.9	5.0	S17SS	50/5			Ш	
45				(50/5")/		¦	][[	-
177.3								<u> </u>
								]
1 -						-		-
1 -								-
1 ]						1		
1 +	48:5	3.0	\S18SS/	50/3		- 1		-
1 +		/	\ <u>\\\</u> 0100\\\	(50/3")		Ŧ		-
50_						ゴ		]
172.3						- 4	} }	-
1 -						-		-
1 ]								]
1 -								-
1 -	<b>§</b> 3:₹					+		-
1 ‡	<del>55.1</del>	2.0	S19SS/	50/2		1		1
55 -				(50/2")			$ \cdot \cdot $	-
55 167.3						一		Auger refusal at 55.8 ft
1 1	55.8				Begin Rock Coring at 55.8 ft helow ground surface		1.11.	
1 -					Begin Rock Coring at 55.8 ft below ground surface See the next sheet for the rock core log	4		-
1 -					Ç	+		-
1 ]						1		
1 -						4		-
1 -						$\dashv$		-
60_								



PROJECT NUMBER: 339179.RD.FI BORING NUMBER: BH-13

SHEET 3 OF 3

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (462988.1 N, 1281644.4 E)

ELEVATION: 222.3 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel

ORIENTATION : Vertical

COMING	J LQOII WILL	11 /11	DIVIL	THOD: ATV, CME 55, NQ size double tube core barre	;I		ORIENTATION : Vertical
WATER	R LEVELS : 32	2.4 ft t	pelow	ground surface START : 3/9/07 08:	15	END: 3/12/07 12:00	LOGGER : R. Calimer
≥	<u> </u>		, ,	DISCONTINUITIES	ő	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	_	CTURES R FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
H BI	T.R.	(%) Q	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	30LI	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
THA	ORE	RQD	FRAC PER F	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	ΥME	AND ROCK MASS CHARACTERISTICS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
۵۵	-55.8	œ	шп		- X//		No contra anti-m
-	-		3	Fractures, medium rough, dark brown staining, gently to moderate dipping, wide to narrow	-\>>	Gneiss* soft to medium soft, fine sand to	No water return = 3 min 28 sec /ft = -
-	1		2	separation	*//	<ul> <li>coarse sand, slightly weathered,</li> </ul>	3 min 21 sec /ft
-	R1NQ 4.6 ft	58		medium rough, steeply dipping	<b>1</b> 33	bluish gray (Gley 2 6/1 10B) when it was wet, light bluish gray ( Gley 2 8/1	2 45 45 100
-	96%	00	3		+	<ul> <li>5B) when it was dry, close to very</li> </ul>	3 min 15 sec /ft, UCS =
-			3		<b>&gt;</b> >>	close spacing	2 min 56 sec /ft
60 <u> </u>	60.4		1	-	-{{	_	1 min 58 sec /ft
-			1	medium rough, dark brown & orange brown	1	-	
-	-		8	staining, wide to narrow separation	-	-	2 min 11 sec /ft
	R2NQ			Fracture, medium rough, black & orange brown		<u></u>	2 min 55 sec /ft
-	5.1 ft	52	3	staining, near vertical, fracture, narrow	-	_	3 min 17 sec /ft
	98%		5		1	<u> </u>  -	
65	-				<b>-</b> >>>	-	3 min 29 sec /ft
157.3	65.5		3	medium rough, black & orange brown staining,	$\mathbb{K}$		4 min 45 sec /ft
-	-		7	very thinly infilled, narrow to wide spare vertical fracture	->//	-	2 min 55 sec /ft
-			5		<b>1</b> 33		2 min 54 and /ft
-	R3NQ	24	3	Fracture, dark brown & orange brown staining,	*//	-	2 min 54 sec /ft
] -	5.1 ft 103%	31	<u>،</u>	steeply dipping	<b>\</b>		3 min 10 sec /ft
_			4		$\mathbb{W}$		3 min 6 sec /ft
70_ 152.3_	70.0		10+	_	->>>	_	4 min 20 sec /ft
102.0_	70.6		~~	vertical & moderate dipping fractures, tight	<b>-</b>	Bottom of Boring at 70.6 ft below	4 11iii 20 Sec /it
-					-	ground surface on 3/12/07 12:00	Note: 1. Water was 32'7" bgs at
1 -					1	_	13:30 on 3/12/2007
-					-	-	2. Water was 32'5" bgs on
1 :					j	_	3/13/2007 and cave in at 42'
75					4	-	bgs _
147.3	1			_	1		
-	-				4	-	-
1 -	1				1	- -	
] -	-				-	-	-
-	1				1	- -	
-	-				-	-	-
80	1			_	1	<del>-</del>	
142.3	-				-	-	_
[ ]	1				1	- -	
] -	-				-	-	-
[ -	1				1	- -	_
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85 <u> </u>	-			_	-	_	_
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1							
L	i		$\Box$				



339179.RD.FI B

BH-14

SHEET 1 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463088.8 N, 1281641.2 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

			SRADE (ft)	ound surface	START : 3/12/07 14:11 END : 3/ SOIL DESCRIPTION		13:00 LOGGER : R. Calimer COMMENTS
]	INTERVA		SIVADE (II)	STANDARD PENETRATION	SOIL BESCHIE HOW	9	COMMENTS
	IN LIXV	RECOVE	ERY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	SYME	INSTRUMENTATION
21.2_	0.0 1.0	12.0	S1SS	2-2	Silt * (ML) brown, moist, medium stiff, low plasticity, trace sand,		PP=1.25 tsf
-	2.0	12.0	S2SS	4-4	rock fragments, and organics, white powdery substance at 1-2' (fill)	-	PP=1.0 tsf
	3.0	9.0	S3SS	4-5	Clayey Silt * (ML) brown, moist, medium stiff, low plasticity, trace mica		
=	4.0	8.0	S4SS	4-6			
5	5.0	0.0	S5SS	7-7			
6.2	6.0	6.0	S6SS	7-9	Sandy Silt * (ML) tan brown, moist, stiff, low to non plasticity, trace rock		PP=1.5 tsf
-	7.0	5.0	S7SS	8-6	fragments		PP=0.25 tsf (breaks)
-	8.0	7.0	S8SS	9-10	Silty Sand (SM) tan brown, most, (80) tan brown, most, (80)		
-	9.0	10.0	S9SS	3-5	brick fragements (fill)		
10_ 1.2	10.5	15.0	S10SS	8-3-3 (6)	coarse gravel, trace clay		
1.2 -	10.5					$  \rangle$	Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO)
-						$ \otimes $	check. UXO was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO
=	13.5						interference was detected. No elevated Photo Ionisation Detector (PID) readings.
+	10.0	12.0	S11SS	7-9-12	Silty Sand * (SM) tan brown, moist, medium dense, fine to medium	<b>-</b>	Torribation Detector (FID) readings.
15 <u> </u>	15.0		000	(21)	grained, nonplastic, trace rock fragments, trace mica (native)	-][]	
						-111	
7							
=	18.5						
=	18.9	11.0	S12SS	50/5 (50/5")	Silty Sand (SM) tan brown, moist, very dense, fine to medium grained,		Sand=70.8%, fines=29.2%
20_ )1.2					nonplastic, partially weathered rock	-]	]
}						-	
						_	
1	23.5						
_	24.4	11.0	S13SS	26-50/5 (50/5")			
25 <u> </u>						1	
-							
-							
-	28.5			40.50/4			
	29.3	10.0	S14SS	40-50/4 (50/4")			
30						111	1



PROJECT NUMBER: BC	RING NUMBER:

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SHEET 2 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463088.8 N, 1281641.2 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 3/12/07 14:11	END : 3/13/		
		XISTING (			SOIL DESCRIPTION	<u> </u>		COMMENTS
	INTERV		, ,	PENETRATION TEST RESULTS			SYMBOLIC LOG	
		RECOVE	DV (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL,	COLOR,	C	DEPTH OF CASING, DRILLING RATE,
		RECOVE		011 011 011	MOISTURE CONTENT, RELATIVE DEN CONSISTENCY, SOIL STRUCTURE, MIN	ISITY OR	1BO	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6" (N)	CONSISTENCT, SOIL STRUCTURE, WIIN	LIVALOGI	SYN	INSTRUMENTATION
191.2				( )	Silty Sand * (SM)		111	
					tan brown, moist, very dense, fine to mediur	m grained,		
-					nonplastic, partially weathered rock	4.	111	-
1 -						- :		<u>-</u>
						]		
-	33.5 33.8	4.0	S15SS	50/4		4		-
-		4.0	<u>(3 1333</u> )	(50/4")				-
35							[ ] ]	<u> </u>
186.2						_		
-						-		-
						].		]
1 7						]		]
1 -	38.5						$ \cdot  $	4
1 =	96:6	1.0	S16SS/	50/1	Sandy Silt * (ML)		tt	1
1 40				(50/1")	tan brown, moist, hard, fine to medium grain	ned,		]
40 <u> </u>					nonplastic, few rock fragments	$\dashv$		
1 -								_
-						-		-
_						-		-
	43.5		0.4=00	50//		]		
-		1.0	\ <u>S17SS</u> /	50/1 (50/1")		-		-
45				(30/1)		-		-
176.2								_
_						-		-
_						-		-
						]	Ш	
-	48.5					-		-
1 1	48:8	1.0	\S18SS/	50/1		-		-
				(50/1")		_	Ш	
50_ 171.2						$\dashv$		_
						1		1
1 ]						]		]
1 -								-
1 7						1		1
1 ]	53.5	10	04000	F0/4		]		]
1 -		1.0_/	\ <u>S19SS</u> /	50/1 (50/1")				-
55 <u> </u>				(55.1)				
166.2						$\exists$		]
1 -								-
1 -						1		1
1 ]						]		]
1 -	58: <del>5</del>							-
†	58:7	2.0	S20SS/	50/2	wet, some rock fragments	1		1
				(50/2")	-	]		]
60		-				-	Ш	-



PROJECT NUMBER: BORING NUMBER	PROJECT NUMBER: BOI
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SHEET 3 OF 4

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463088.8 N, 1281641.2 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER	LEVELS	3 : 32.4 ft	below gr	ound surface	START : 3/12/07 14:11	END : 3/1	3/07	07 13:00 LOGGER : R. Calimer
			SRADE (ft)		SOIL DESCRIPTION		П	COMMENTS
	INTERVA	AL (ft)		STANDARD PENETRATION TEST RESULTS			SYMBOLICLOG	0)
		RECOVE	ERY (in)	TEOT REGGETO	SOIL NAME, USCS GROUP SYMBOL, CO MOISTURE CONTENT, RELATIVE DENSI CONSISTENCY, SOIL STRUCTURE, MINEF	DLOR,		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINER	RALOGY	MB	INSTRUMENTATION
				(N)			λS	λs
161.2_							$\blacksquare$	
-							$\parallel \parallel$	Auger refusal at 62.2 ft bgs
-	62.2					,	111	Auger relusar at 02.2 it bys
-	02.2				Begin Rock Coring at 62.2 ft below ground sui	rface	7''	<b>'</b>
-					Begin Rock Coring at 62.2 ft below ground sur See the next sheet for the rock core log		┨	
1 -							1	
							4	
65 <u></u> 156.2						_	┨	-
							1	
] -							-	
-							1	
1 -							1	
-							-	
-							1	
70 <u> </u>						_	1	_
151.2_							-	
-							1	
-							1	
-						,	┨	
-						•	1	
-							1	
75							1	
146.2						_	1	-
_							1	
-							1	
_						•	1	
_							4	
-							┨	
I							1	
80 <u></u> 141.2						_	-	-
' ' ' ' -						•	1	
] -							1	
-							-	
-							1	
] -							-	
-						•	1	
85 <u> </u>						_	1	_
136.2							-	
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90 -							-	
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PROJECT NUMBER: BORING NUMBER: 339179.RD.FI

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SHEET 4 OF 4

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463088.8 N, 1281641.2 E)

ELEVATION: 221.2 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD: ATV. CME 55, NQ size double tube core barrel ORIENTATION · Vertical

CORING	<u> EQUIPMEN</u>	IT AN	D ME	THOD: ATV, CME 55, NQ size double tube core barr	el		ORIENTATION : Vertical
WATER	LEVELS : 32	2.4 ft b	pelow	ground surface START : 3/12/07 1	4:11	END: 3/13/07 13:00	LOGGER : R. Calimer
				DISCONTINUITIES		LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	R Q D (%)	FRACTURES PER FOOT	DESCRIPTION  DEPTH, TYPE, ORIENTATION, ROUGHNESS, PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE, WEATHERING, HARDNESS, AND ROCK MASS CHARACTERISTICS	SIZE AND DEPTH OF CASING, FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
65_ 156.2_	R1NQ 3.8 ft 88%	44	4 3 5	medium rough, brown staining, moderate dipping, thin silt & sand infilling, narrow to wide separation		- Gneiss* - medium soft, fine sand to coarse sand, - slightly weathered to moderately - weathered, bluish gray (Gley 2 5/1 - 10B) when it was wet, light bluish gray - (Gley 2 8/1 5B), when it was dry, close - to very close spacing - 64.6'-65.2' highly weathered, soft	2 min 45 sec /ft  2 min 36 sec /ft, UCS = 4888 psi 2 min 51 sec /ft
70_ 151.2	R2NQ 4.6 ft 98%	67	9 2 2 4 2	Mechanical break, brown & orange brown staining very steeply dipping fracture		- - - - - -	3 min 20 sec /ft 2 min 50 sec /ft 3 min 09 sec /ft 2 min 35 sec /ft
-	R3NQ 4.6 ft 107%	78	4 3 2			- - - - - -	3 min 25 sec /ft 3 min 10 sec /ft 3 min 40 sec /ft 2 min 53 sec /ft
75_146.2_	75.2 R4NQ 2 ft 100%	58	2 3 3	_		- - - - - - Bottom of Boring at 77.2 ft below	1 min 35 sec /ft 2 min 49 sec /ft 3 min /ft  Note:
80 141.2_				-		- ground surface on 3/13/07 13:00 - - - - - - -	1. Water was 35'6" bgs, cave in at 61' on 3/13/2007 14:45  2. Water was 32'5" bgs, cave in at 60' on 3/14/2007 13:00
85_ 136.2_				-		- - - - - -	-
-						- - - - - -	- - - - -
90 <u>-</u> 131.2_ - -				_	- - - - - - - - -	- - - - -	



BORING NUMBER: PROJECT NUMBER: 339179.RD.FI

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SHEET 1 OF 3

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463174.8 N, 1281650.8 E)

ELEVATION: 220.1 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 3/13/07 15:15 END : 3			12:05 LOGGER : R. Calimer	
			GRADE (ft)	STANDARD	SOIL DESCRIPTION	$\neg r$		COMMENTS	_
	INTERV	AL (ft)		PENETRATION TEST RESULTS			ر آ		
		RECOVI	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		ZOLK ZOLK	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION	
220.1_	0.0 1.0	9.0	S1SS	1-3	Clayey Silt * (ML) brown, moist, medium stiff, low plasticity, trace sand ,	-X	$\overset{\times}{\otimes}$	PP=1.0 tsf	-
_	2.0	6.0	S2SS	50/6	rock fragments,and organics (fill)	×	$\boxtimes$		-
-	3.0	12.0	S3SS	3-5	Sandy Silt * (ML) tan brown, moist, stiff to very stiff, nonplastic, few rock	- <b>K</b>	$\otimes$		_
-	4.0	11.0	S4SS	7-8	fragments, trace mica (fill) few clay, quartz gravel	-	$\otimes$		_
5	5.0	4.0	S5SS	6-7	iew day , qualiz gravei		$\otimes$		_
-	6.0	10.0	S6SS	6-5	Sandy Silt (ML)		$\stackrel{\otimes}{\otimes}$	PP=1.75 tsf, Sand=43.4%, Silt=50.2%,	-
_	7.0	7.0	S7SS	2-5	red brown, moist, medium stiff to stiff, low plasticity, trace rock fragments, trace brick fragments few clay	*	$\otimes$	Clay=6.4%, LL=30, PL=27, Pl=3	_
_	8.0	10.0	S8SS	4-4	(fill)	TX	$\otimes$	PP=0.25 tsf	-
_	9.0	12.0	S9SS	2-2 1-2-3			$\otimes$	PP=1.0 tsf	_
10 210.1_	10.5	13.0	S10SS	(5)			$\otimes$		_
							$\otimes$	Note: Split spoon was sampled every 1 ft for top 10 ft due to Unexploded Ordnance (UXO)	-
_						<b>-</b>	$\otimes$	check. UXO was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO	-
	13.5					-	$\otimes$	interference was detected. No elevated Photo lonisation Detector (PID) readings.	-
45 -	45.0	15.0	S11SS	4-4-4 (8)	Silty Sand * (SM) tan brown, (tan brown), moist, loose, very fine to fine				-
15_ 205.1_	15.0			. ,	grained, trace rock fragments	<del>-</del>			_
_						- []			-
-						‡			_
_	18.5			44.00.50/5	Sandy Silt * (ML)	4	Ш		-
20	19.9	17.0	S12SS	14-32-50/5 (82/11")	tan brown, moist, hard, nonplastic, few rock fragments	4			-
200.1						4			_
_						4			-
-						4			-
-	23.5	8.0	S13SS	40-50/2	trace rock fragments	1			-
25	24.2	0.0	3 1000	(50/2")		1			-
195.1						7			_
-						1			-
						]			-
-	28.5 28.9	5.0	S14SS	50/5		-			-
30				(50/5")		]			_
						T			
		1							



PROJECT NUMBER:	ORING NUMBER:

339179.RD.FI

BH-15

SHEET 2 OF 3

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463174.8 N, 1281650.8 E)

ELEVATION: 220.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 3/13/07 15:15	END : 3/14		
			SRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS
	INTERV			PENETRATION TEST RESULTS			LOG	
		RECOVE	ERY (in)	IESI KESULIS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
			#TYPE	6"-6"-6"	MOISTURE CONTENT, RELATIVE DENSI CONSISTENCY, SOIL STRUCTURE, MINER	RALOGY	MBC	DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
			# · · · · · ·	(N)			SΥ	
190.1_					Sandy Silt * (ML)	_	$\  \ $	
_					tan brown, moist, hard, nonplastic	-	$\  \ $	
						_	1	
-						-	$\  \ $	
	33.5 33.8					_	1	
_	33.0	4.0	<u>S15SS</u>	50/4 (50/4")		-	$\  \ $	
35				(00/1)			1   1	_
185.1_						-	$\  \ $	
_						_	1	
] -						_	$\  \ $	
-						-	<u>   </u>	
	38.5	6.0	S16SS	50/6	wot	-		
-	39.0	6.0	31033	ال الا	wet	-	$\  \ $	
40_							1	_
180.1_						-	$\  \ $	
						_	1	
_						-	$\  \ $	
-						_	<u>                                      </u>	
_	43.6	1.0	\S17SS/	50/1		-	$\  \ $	grinding from 45' to 48.5'
_		\1.0/	\ <u>31733</u> /	(50/1")		_	1111	giriding from 45 to 46.5
45 <u> </u>							$\  \ $	-
1/5.1_						_	$\  \ $	
_						_	1111	
_						-		
	40 -					-		
-	48.5 48.7	0.0	S18SS	50/0	Degin Deals Coping at 40.7 ft below and	-	Ш	Auger refusal at 48.7 ft bgs
				22.0	Begin Rock Coring at 48.7 ft below ground su See the next sheet for the rock core log	nace -		
50 170.1					· · · · · · · · · · · · · · · · · · ·		1	_
						-	1	
-						-	1	
						-	1	
] -						_	1	
] -						-	1	
						_	ł	
55 <u></u> 165.1							1	_
						_	1	
-						_	ł	
						_	1	
-						_	1	
						_	1	
60						_	-	
- 00_							Н	



339179.RD.FI BH-15

SHEET 3 OF 3

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (463174.8 N, 1281650.8 E)

ELEVATION: 220.1 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : ATV, CME 55, NQ size double tube core barrel ORIENTATION : Vertical

CORING	<u>G EQUIPMEN</u>	IT AN	ID ME	THOD: ATV, CME 55, NQ size double tube core barre	el		ORIENTATION : Vertical
WATER	R LEVELS : 34	4.0 ft I	below	ground surface START : 3/13/07 1	5:15	END: 3/14/07 12:05	LOGGER: R. Calimer
>	<u> </u>			DISCONTINUITIES	Ŋ	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)		ES	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR,	SIZE AND DEPTH OF CASING,
A BE	L SET	%)	JUR 00	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	OLIC	MINERALOGY, TEXTURE, WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND
PTF.	NG G	R Q D (%)	FRACTURES PER FOOT	PLANARITY, INFILLING MATERIAL AND	MB	AND ROCK MASS	SMOOTHNESS, CAVING ROD DROPS, TEST RESULTS, ETC.
20.00		22	# #	THICKNESS, SURFACE STAINING, AND TIGHTNESS	Ś	CHARACTERISTICS	, , , , , , , , , , , , , , , , , , ,
-	48.7 R1NQ		1	Fracture, medium rough, dark brown and orange brown staining, gently to modrate		<ul> <li>Gneiss *</li> <li>soft to hard, medium sand to coarse</li> </ul>	2 min 41 sec/ft
50 170.1	2.2 ft	68	1	dipping, very thinly filled with sand, narrow -	-8//	<ul> <li>sand, slightly weathered, greenish</li> </ul>	2 min 40 sec/ft, UCS =
170.1_	50.9		1 XXX	separation	1	<ul><li>gray (Gley 1 5/1 10Y) when it was wet,</li><li>white (Gley 1 8/N) when it was dry,</li></ul>	6522 psi –
-			2		$\mathbb{Z}$	- close to moderate close spacing	2 min 40 sec/ft
-	1		2		<b>-</b> >>>	-	2 min 55 sec/ft
_	R2NQ				$\mathbb{Z}$	<del>-</del> -	_
-	5 ft 100%	90	1		<b>-</b> >>>	-	-
	100%		1		$\mathbb{X}$	<del>-</del> -	-
55 <u> </u>	-		2	-	->//	_	3 min 16 sec/ft
	55.9				1	-	
1 -	1		1		- 1//	-	-
-			3				-
-	R3NQ 5 ft	70	1		+	-	2 min 56 sec/ft
-	92%	' "			$\rightarrow$		2 min 39 sec/ft
60_ 160.1	1		4	_		<del>-</del>	2 min 42 sec/ft
160.1_	60.9		$\times$			_	-
-	DANO		3		<b>-</b> >>>	_	7 min for run R4
-	R4NQ 2.8 ft	74	3			_	-
-	98%		2		->//	_	-
-	63.7		<del></del>		<del>-</del>   Y	Bottom of Boring at 63.7 ft below	-
65	-				1	<ul> <li>ground surface on 3/14/07 12:05</li> </ul>	Note: 1. Water was 30'7" bgs,
155.1	1			_	7	<del>-</del> -	cave in at 55'4" on
-	-				-	=	3/14/2007 13:05
-					1	<del>-</del> -	2. Water was 34' bgs, cave in at 51'10" on 3/15/2007
-	_				1	-	08:00
-					7 1		_
-	1				1	-	-
70 <u> </u>	]			-	7 1		
130.1_	1				1	-	-
] -	]				7 1		]
-	1				1	-	-
1 -	-				4	_	_
1 -					<u> 1</u>	-	_
75	-				4	_	-
145.1	1			-	1		_
-	-				4	-	-
1 -	1				1	-	]
-	-				4	_	-
1 -	1				1	<del>-</del> -	_
1							



BORING NUMBER: PROJECT NUMBER: 339179.RD.FI

**BH-16** 

SHEET 1 OF 3

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (463235.5 N, 1281665.7 E)

ELEVATION: 219.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

				ound surface	START : 3/19/07 07:30 END	3/19/			
			GRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS	_
	INTERV	AL (ft)		PENETRATION			LOG		_
		RECOVE	ERY (in)	TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		SLIC	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION	
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	′	SYMBOLIC LOG		
219.9_	0.0 1.0	12.0	S1SS	2-4	Silt * (ML) brown, moist, low plasticity, trace organics, trace sand	1&	$\otimes$	PP=1.0 tsf	
_	2.0	7.0	S2SS	4-8	rock fragments (fill)		$\bigotimes$		-
-	3.0	8.0	S3SS	20-27	Sandy Silt * (ML) tan brown, moist, nonplastic, trace rock fragments, trace	ce 🚽	X	PP=0.0 tsf (non cohesive)	-
_	4.0	7.0	S4SS	26-12	mica (fill) wood fragments at 3.5ft	-	$\overset{\times}{\times}$		-
5_ 214.9	5.0	3.0	S5SS	8-7	few gravels		$\overset{\times}{\otimes}$		_
-	6.0	7.0	S6SS	6-6	trace clay	7	$\otimes$	PP=0.75	-
_	7.0	7.0	S7SS	4-4	uace day	7	$\overset{\times}{\times}$	11 -0.70	-
-	8.0	6.0 12.0	S8SS S9SS	6-5 3-6		<b>1</b>	$\otimes$		-
_	9.0			5-5-5	Sandy Silt (ML)	$\overline{}$	$\overset{\times\times}{\otimes}$	Sand=31.4%, Silt=57.8%, Clay=10.8%	-
10 <u> </u>	10.5	11.0	S10SS	(10)	brown, moist, low plasticity, few clay, trace few sand & rock fragments (fill)	' <b>→</b>	$\overset{\times}{\otimes}$	LL=31 , PL=19 , PI=12	_
_						\$	$\overset{\otimes}{\otimes}$	Note: Split spoon was sampled every 1 ft for	-
-						1	$\otimes$	top 10 ft due to Unexploded Ordnance (UXO) check. UXO was performed every 1 ft from 0 to 10 ft and at 13.5, 18.5, and 23.5 ft. No UXO	-
-	13.5				Silty Sand* (SM)		$\overset{\times}{\times}$	interference was detected. No elevated Photo Ionisation Detector (PID) readings.	-
15	15.0	14.0	S11SS	15-18-18 (36)	tan brown, wet, dense, very fine to medium grained, trace rock fragments, partially weathered rock			Chloride=13 ppm, pH=4.1, Resistivity=13700 ohm-cm, Sulfate=45 ppm.	-
204.9_						7			_
_						<u>.</u>			-
-									
_	18.5 19.3	10.0	S12SS	30-50/4	very dense	<u></u>			
20 <u></u> 199.9				(50/4")					_
-						=======================================			-
_									
-	<u> 23.5</u>					- 1			
	∠3.1	3.0	<u>(S13SS</u>	50/3 (50/3")		]			-
25 <u> </u>									-
-						<u></u>			-
-						‡			
-	28.5	40.0	04400	41-50/4		#			
30	29.3	10.0	S14SS	(50/4")		‡			-
						1			



PROJECT NUMBER:	BORING NUMBER:
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SHEET 2 OF 3

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463235.5 N, 1281665.7 E)

ELEVATION: 219.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

					inted, CME 55, 2-1/4" ID HSA, 140 lb hammer wi				
		S : 36.5 ft XISTING (		ound surface	START : 3/19/07 07:30 SOIL DESCRIPTION	END : 3/	<u>19/07</u>	10:45 LOGGER : R. Calimer COMMENTS	
DEPIRE			PIKADE (II)	STANDARD PENETRATION TEST RESULTS	SOIL DESCRIF HON		98	CONTINUENTS	
	INTERV			TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,	COLOR	SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,	
		RECOVE			MOISTURE CONTENT, RELATIVE DENS	SITY OR	BOL	DRILLING FLUID LOSS, TESTS, AND	
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINE	ERALOGY	₩	INSTRUMENTATION	
189.9				(N)	Silty Sand* (SM)		717	- <u> </u> - L'1	
100.0_					tan brown, wet, dense, very fine to medium of	grained,	]		
-					trace rock fragments, partially weathered roc	k	4111	} <b>1</b>	
-							-[][]		-
							1111	<b> -</b>	
_	33.5 33.8	4.0	S15SS/	50/4			-!!!!	<b>[.</b> ]	
1 =		4.0	<u> </u>	(50/4")				<u>:</u>	
35 <u> </u>						_	411	[.]	_
184.9_							-	<u>:</u>	-
							1111	<b>{ </b>	
-							4:11	[]	-
-							<b> </b>	[]	-
] -	38.5	10	01600	F0/4			]	<b>}1</b>	-
-		1.0	\ <u>S16SS</u> /	50/1 (50/1")			<b>- </b>	[1]	-
40 <u> </u>				\==-, ,		_	411	<b>{·</b> ]	_
179.9_							-		-
-							+	[:	-
_							111	[ <b>.]</b>	
-							-	<u> </u>	-
_	43.6							<b>[·]</b>	
-		1.0	\ <u>S17SS</u> /	50/1 (50/1")			-		-
45				(50/1)			+[]	:	-
174.9_						_	][[]	[ <b>.]</b>	
-							-	<u>.</u>	-
_								<b> -  </b>	-
_							-:::::	<u> </u>	-
-	48.5						111	[:	-
			\S18SS/	50/1			]	1	
50 -	50.0			(50/1")			<b>- </b>	Auger refusal at 50 ft bgs.	-
169.9					Begin Rock Coring at 50.0 ft below ground s	urface	1	<u>'</u>	
-					See the next sheet for the rock core log		-		-
-							1		-
							1		
-							+		-
							1		
<sub>55</sub> -							-		-
55_ 164.9						-	1		_
							1		
-							-		-
1 -							1		
-							-		-
-							1		-
							1		
60_							+	<del> </del>	
		l	l					1	



BORING NUMBER: PROJECT NUMBER: 339179.RD.FI

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SHEET 3 OF 3

# **ROCK CORE LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (463235.5 N, 1281665.7 E)

ELEVATION: 219.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

CORING EQUIPMENT AND METHOD : Truck Mounted, CME 55, NQ size double tube core barrel ORIENTATION: Vertical

CORING	3 LQUIF WILL	II AIN	DIVIL	THOD: Truck Mounted, CME 55, NQ size double tube	core i	Dailei	ORIENTATION : Vertical
WATER	LEVELS: 36	3.5 ft b	oelow	ground surface START : 3/19/07 07	:30	END : 3/19/07 10:45	LOGGER : R. Calimer
<u> </u>	Q.%			DISCONTINUITIES	90	LITHOLOGY	COMMENTS
DEPTH BELOW SURFACE (ft)	CORE RUN, LENGTH, AND RECOVERY (%)	· (c)	FRACTURES PER FOOT	DESCRIPTION	SYMBOLIC LOG	ROCK TYPE, COLOR, MINERALOGY, TEXTURE,	SIZE AND DEPTH OF CASING,
THE	STR OVE	%) _	E S	DEPTH, TYPE, ORIENTATION, ROUGHNESS,	BOL	WEATHERING, HARDNESS,	FLUID LOSS, CORING RATE AND SMOOTHNESS, CAVING ROD
SUR.	RENCA	R Q D (%)	FRA	PLANARITY, INFILLING MATERIAL AND THICKNESS, SURFACE STAINING, AND TIGHTNESS	SYM	AND ROCK MASS CHARACTERISTICS	DROPS, TEST RESULTS, ETC.
169.9	50.0			medium rough, black and orange brown,	W/	Gneiss*	3 min/ft
_	]		2	gentely to moderate dipping, narrow to wide		very soft to medium soft, moderately	
-	1		5	separation	+	weathered to slightly weathered, greenish gray (Gley 1 5/1 10Y) when it	2 min 43 sec/ft
_	R1NQ 5 ft	52	2	Joint, very steeply dipping	$\gg$	was wet, greenish gray (Gley 1 8/1	2 min 40 sec/ft, UCS =
-	97%	02			+	10Y) when it was dry, fine to coarse graind, close spacing	4048 psi 3 min 20 sec/ft
_	<u> </u>		1		$\rangle\!\!\!/$	53.4'-53.6' highly to completely	5 min 20 3co/it
55 -	55.0		4		+	weatthered	3 min 10 sec/ft
164.9	55.0		3	tight to wide separation		 medium soft to hard, slightly	2 min 50 sec/ft
-	-		_		<b>-</b>	weathered to moderately weathered, bluish gray (Gley 2 2/6 10 B) when it	3 min 34 sec/ft, UCS =
_	R2NQ		3		$\mathbb{K}$	was wet, light bluish gray (Gley 2 8/1	8868 psi
-	4.8 ft 104%	71	3		$\longrightarrow$	10B) when it was dry	3 min 30 sec/ft
_	10470		2		$\mathbb{W}$	- -	3 min 10 sec/ft
-	50.0		3				3 min 17 sec/ft
60 <u> </u>	59.8		2	narrow to tight —	<b>&gt;</b>	medium soft to hard	3 min 25 sec/ft
_	]		3	60'7" to 61' 5", near vertical fractures			3 min 25 sec/ft
-	R3NQ					- -	
-	5 ft 102%	77	2	Mechanical break	$\gg$		3 min 20 sec/ft
-	-		1		$\mathbb{W}$	_	3 min 30 sec/ft
65	64.8		1				3 min 50 sec/ft
154.9	]			_	1	Bottom of Boring at 64.8 ft below ground surface on 3/19/07 10:45	2/20/07 07:40
-	-				1		3/20/07, 07:40 cave in at 47.5', water at
-							\\\36.5' \[ 36.5 ft, cave-in at \]
_	1					<u></u>	47.5 ft, 3/20/2007 07:40
-					-		-
1 -	]				1	_	_
70 <u> </u>				_	-		
	]				1	_	]
-	-				-	_	-
_	]						_
-	1				-	_	-
_	]						-
75 <u></u> 144.9	-				1	_	-
144.9_				_			
_	1				1	_	_
] -					{		-
	]				1	<u>-</u> _	
-					<b>{</b>	_	-
80	]				1	<del>-</del> -	-
					$\Box$		



PROJECT NUMBER:	BORING NUMBER:
339179.RD.FI	GCP-5

SHEET 1 OF 1

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454589.5 N, 1285018.1 E)

ELEVATION: 134.7 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

-			AND MET	HOD: Truck Mou	unted, CME 55, 2-1/4" ID HSA, 140 lb hammer with cathead, 2"			· · ·	
WATER					START : 3/8/07 10:28 END : 3/8	8/07	7 11		
DEPTH B		XISTING C	SRADE (ft)	STANDARD	SOIL DESCRIPTION	4	၅	COMMENTS	
	INTERV	AL (ft)		PENETRATION TEST RESULTS	COIL NAME LICCO OPOUR OVARDOL COLOR		CLC		
		RECOVE	ERY (in)		SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		30LI	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND	
			#TYPE	6"-6"-6"	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		SYMBOLIC LOG	INSTRUMENTATION	
134.7	0.0			(N)	Grass Surface, Wet Surface	+	S	PP=2 tsf	
]	0.0	6.0	S1SS	3-4-2-3	Silt * (ML)	1		11 -2 (3)	
1 7	2.0	0.0	3133	(6)	dark gray, wet, firm, a lot of rooflets	4			
+	2.0				yellowish brown & gray, damp to dry, stiff, fine grained	-11			
]		18.0	S2SS	1-2-9-15	, e, e, e. g.e., e	4			
-	4.0	10.0	0200	(11)		-11			
l j	7.0				hard, trace of fine gravel & sand	1		PP=4.5+ tsf	
5 129.7		24.0	S3SS	8-12-23-26	-			-	
129.7	6.0			(35)		$\parallel$			
]				0.40.15.15	bluish gray & yellow, damp, very stiff, low plasticity,	4		PP=4.5+ tsf, Chloride=13 ppm, pH=5.27,	
-		24.0	S4SS	6-10-13-17 (23)	trace of gravel up to 0.5" in size, low cohesion	$\ \cdot\ $		Resistivity=7610 ohm-cm, Sulfate=89 ppm.	
	8.0			(23)		1	Ш		
				F 7 40 40	Sandy Silt * (ML)	$\exists$		PP=4.5+ tsf	
-		18.0	S5SS	5-7-10-16 (17)	gray & yellow, damp, very stiff, fine grained, low to medium plasticity	$\parallel$			
10_	10.0			(.,,	<del></del>	4		_	
124.7						-41		grinding at 12'	
-						-11			
						4			
-						-11			
1 1	13.5								
1 7		40.0	0000	7-15-21	Poorly Graded Sand W/ Silt * (SP-SM)	-13			
15	15.0	18.0	S6SS	(36)	yellowish brown w/ black, dry, dense, very fine grained	Hi			
119.7					-	1:		-	
-						-13			
						;i			
_						-13			
-	18.5					Hi	ij		
		5.0	S7SS	29-50/5	damp to moist, very dense	1:		tip separated from spoon, not much sample	
20	19.4			(50/5")		-1		left	
114.7					Bottom of Boring at 19.9 ft below ground surface on	Ť		-	
]					3/8/07 09:15	1		Note:	
-						+		Water table was 18' bgs before augers pulled out	
						1		·	
-						+		2. Temporary well was installed. Bottom of the temporary well is 19.9'bgs, about 10' of slotted	
-						1		zone at bottom	
]						1		3 Mater was at surface on 3/0/2007, which is	
25 <u> </u>					-	$\dashv$		3. Water was at surface on 3/9/2007, which is possibly due to melted snow on the previous	
]						1		and the same day	
-						+			
						1			
]						1			
-						+			
						1			
30						+			
		I	I			L			



PROJECT NUMBER: 339179.RD.FI BORING NUMBER: GCP-6

SHEET 1 OF 2

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design

LOCATION: (454557.1 N, 1285058.9 E)

ELEVATION: 148.9 ft

DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER					unted, CME 55, 2-1/4" ID HSA, 140 Ib nammer with cathead, 2" OD Split Spoon  START : 3/9/07 07:45  END : 3/9/07 09:50  LOGGER : X.Xia				
			GRADE (ft)	STANDARD	SOIL DESCRIPTION COMMENTS				
	INTERV	TERVAL (ft)		INTERVAL (ft)		DENETRATION		PENETRATION	ŏ
		RECOVE	ERY (in)	TEOT REGOLIO	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND				
			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION				
148.9_ - -	2.0	12.0	S1SS	10-11-6-7 (17)	Gravel Surface Silty Sand W/ Gravel * (SM) gray brown, dry, medium dense, fine to medium gravel up to 1" in size (Fill)				
- - -	4.0	12.0	S2SS	7-6-6-7 (12)	Sandy Silt (ML) yellowish brown, dry, stiff, trace of fine gravel (Fill)  Gravel=1.6%, Sand=30.5%, Fines=67.8%				
5	6.0	12.0	S3SS	4-3-5-6 (8)	grayish brown, moist, stiff, nonplastic				
-	8.0	10.0	S4SS	3-3-4-4 (7)	Silt * (ML) yellow & gray, moist to damp, fine grained, firm, cohesion less				
10	10.0	12.0	S5SS	2-2-3-4 (5)	Clayey Sand (SC) olive brown, moist, loose, few gravel  PP=0.8 tsf, Shell by tubes were taken from off set borehole from 8-10' and from 10' to 12'				
138. <u>9</u> - -	12.0	12.0	S6SS	1-2-3-3 (5)	fine to medium grained, orange staining (Fill)  Gravel=6.0%, sand=52.85%, fines=41.06%, LL=45%, PL=17, Pl=28, CU triaxial test: c'=102 psf, phi'=30.6 degree				
-	14.0	14.0	S7SS	1-2-3-4 (5)	Sandy Silt (ML) yellowish brown w/ black staining, moist to damp, firm, fine grained, (Fill)  Gravel=0%, sand =42.2%, fines=57.7% (12'- 14')				
15 <u> </u>	16.0	14.0	S8SS	1-3-4-3 (7)	Silt * (ML) gray yellow, moist, fine grained, low to medium plasticity, firm, cohesionless (Fill)				
-	18.0	18.0	S9SS	2-2-14-14 (16)	Silty Sand * (SM) grayish brown, moist, medium dense, fine sand, trace of				
20_	20.0	18.0	S10SS	9-13-17-24 (30)	fine gravel Sandy Silt * (ML) brown & gray, dry, very stiff, fine grained, cohesion				
128.9_ - - -					- - - -				
- - -	23.5			12-18-22	Silty Sand* (SM)				
25_ 123.9_	25.0	6.0	S11SS	(40)	yellowish brown, damp to dry, dense, fine grained				
-									
-	28.5	40.0	04000	11-15-21	grayish brown /black staining				
30_	30.0	16.0	S12SS	(36)					



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GCP-6

SHEET 2 OF 2

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454557.1 N, 1285058.9 E)

ELEVATION: 148.9 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER					unted, CME 55, 2-1/4" ID HSA, 140 Ib hammer with cathe START : 3/9/07 07:45 EN	ND : 3/9/0		
			GRADE (ft)	STANDARD	SOIL DESCRIPTION			COMMENTS
	INTERV			PENETRATION TEST RESULTS	SOIL NAME, USCS GROUP SYMBOL, COLOR,		SYMBOLIC LOG	DEPTH OF CASING, DRILLING RATE,
		RECOVI	ERY (in)		MOISTURE CONTENT, RELATIVE DENSITY OF	R	BOLI	DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	CONSISTENCY, SOIL STRUCTURE, MINERALOG	GY	SYM	INSTRUMENTATION
118.9_					Silty Sand* (SM)			
_					yellowish brown, damp to dry, dense, fine to mediur grained, partially weathered rock	" ]		
_						4		
_								
_	33.5			38-45-50/2	wet, fine to medium grain sand	=	$\  \ $	
35	34.7	12.0	S13SS	(95/8")	,	]		
113.9						_		spoon is wet
-						-		
-							:  }	
-								1
_	38.5 39.0	4.0	S14SS	50/6	grayish brown, dry, very dense, fine grained	4	<u>.  </u>	1
	00.0	1.0	01100	00/0	grayion brown, dry, very deribe, line grained	_		
40 <u> </u>							$\  \ $	wet soil came out during drilling
_								j
_								-
_						4		
_	43.5		04500	50/4		1	$\  \ $	]
-		0.0	\ <u>S15SS</u> /	50/1 (50/1")	no recovery, some wet mud	-		significant bouncing
45 <u> </u>						_		-
-								
-						-		
_						4	:  }	
_	48.5							
-		0.0	∖ <u>S16SS</u> /	50/1 (50/1")	Bottom of Boring at 48.6 ft below ground surface on 3/8/07 09:15	1		Note:
50 98.9					5.5.5. 66.16	4		Rig pushing down pressure was about 500
30.5 _								psi when grinding
=						-		2. Auger refusal at 48.6 ft bgs.
_								3. Water was 34'6" before pulled out auger.
_ _						-		4, Water was 25.5' bgs after pulled out auger, cave in at 44.5'.
-								
55 93.9						4		5. The hole was grouted from bottom up using trieme at the end of boring.
_								
-						-		
_						1		
_								
_						-		
60_								
		1	1					



PROJECT NUMBER:	BORING NUMBER:
339179.RD.FI	GPS-3

GPS-3

SHEET 1 OF 1

#### **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION: (454227.9 N, 1284887.9 E)

ELEVATION: 147.4 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

WATER			TAD IVIE	TIOD : TIGOR MICE	Unted, CME 55, 2-1/4" ID HSA, 140 Ib nammer with catnead, 2" OD Split Spoon  START : 3/8/07 09:25 END : 3/8/07 10:00 LOGGER : X.Xia
		XISTING (	GRADE (ft)	STANDARD	SOIL DESCRIPTION COMMENTS
[ [	INTERV	AL (ft)	<u> </u>	PENETRATION TEST RESULTS	βÖ
		RECOVE	ERY (in)	ILOTINESULIS	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR DRILLING FLUID LOSS, TESTS, AND
			#TYPE	6"-6"-6" (N)	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY  DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION
147.4_ - -	2.0	8.0	S1SS	5-11-22-21 (33)	Grass Surface Coverd W/snow Sandy Silt * (ML) brown to dark brown, damp to dry, hard, trace of gravel up to 1" in size, trace of rootlets (fill)
	4.0	12.0	S2SS	8-12-12-12 (24)	Silty Sand/sandy Silt * (SM/ML) brown, dry, very stiff, medium dense, trace of gravel up to 0.5" (shining in sun), (fill)
5 142.4	6.0	16.0	S3SS	3-5-7-9 (12)	Silty Sand * (SM) yellowish brown, damp to dry, medium dense, fine grained, trace of rooflets, homogeneous
-	8.0	18.0	S4SS	3-4-4-6 (8)	Silt * (ML) olive, damp to moist, medium plasticity, firm
10	10.0	18.0	S5SS	3-4-4-6 (8)	PP=1.5 tsf
137.4	1010				yellowish brown, damp, hard, medium to low plasticity PP=4.5+ tsf
- - -	13.5		S6SS	9-12-19	
15	15.0		0000	(31)	
132.4 - 20 127.4 - 25 122.4 - 30					Bottom of Boring at 15.0 ft below ground surface on 3/8/07 10:00  Note: 1. No water was observed during drilling 2. Dry and cave in at 12' on 3/9/2007 11:30 am



339179.RD.FI GPS-4

SHEET 1 OF 1

# **SOIL BORING LOG**

PROJECT : Washington Aqueduct Residuals Design LOCATION : (454278.3 N, 1284895.2 E)

ELEVATION: 147.5 ft DRILLING CONTRACTOR: Froehling and Robertson, Inc.

DEPTH BELOW EXISTING GRADE (ft)  INTERVAL (ft)  STANDARD PENETRATION TEST RESULTS  SOIL NAME, USCS GROUP SYMBOL, COLOR,  DEPTH OF CASING, DRILLING RA		LOGGER : X.Xia		END : 3/8/0	ounted, CME 55, 2-1/4" ID HSA, 140 lb hammer START : 3/8/07 08:30		10		LEVELS	
NTERVAL (ft)			П			STANDARD	SRADE (ft)			
147.5	ΓE,	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, AND INSTRUMENTATION				PENETRATION			INTERV	
147.5	ND <sup>°</sup>			ISITY OR	MOISTURE CONTENT, RELATIVE DEI			RECOVE		
18.0   S2SS   7-7-9-8   Silt* (ML)   brown, gray, damp to dry, very stiff, (fill)   PP=3 tsf				nse, trace of	Silt Sand * (SM) yellowish brown w/black, moist, medium de	10-5-7-11	S1SS	10.0		147.5_ - -
18.0   S3SS   4-4-6-7 (10)   Yellowish brown, damp, stiff, loose, fine grained   15   15   15   15   15   15   15   1		3 tsf		- - -	Silt* (ML) brown, gray, damp to dry, very stiff, (fill)		S2SS	18.0		-
Silt * (ML)   SSSS   2-2-3-4   (S)   Self * (ML)   SSSS   SSS   SSS   SSS   SSS   SSSS   SSSS   SSSS   SSSS   SSSS   SSSS   SSSS   SSSSS   SSSSS   SSSSS   SSSSS   SSSSSS				ined	yellowish brown, damp, stiff, loose, fine gra		S3SS	18.0	6.0	5 12.5
18.0 S5SS 2-2-3-4 (5)  18.0 S5SS 2-2-3-4 (5)  19.0 S6SS 30-17-23 (40)  Poorly Graded Sand* (SP)  Vellow, dry, dense, fine grained, trace of fine gravel Bottom of Boring at 15.0 ft below ground surface on 3/8/07 09:15  Note: 1. No water observered at drilling, cavil 3/8/07 09:15  2. Dry and cave in at 11.5' bgs on 3/9/					Silty Sand * (SM) yellowish brown, dry, loose, fine grained		S4SS	5.0	8.0	-
Poorly Graded Sand* (SP) yellow, dry, dense, fine grained, trace of fine gravel Bottom of Boring at 15.0 ft below ground surface on 3/8/07 09:15  Note: 1. No water observered at drilling, cavall 15.5 by safter drilling 2. Dry and cave in at 11.5' by son 3/9/		l.1 tsf		- - -			S5SS	18.0		- - 10
yellow, dry, dense, fine grained, trace of fine gravel Bottom of Boring at 15.0 ft below ground surface on 3/8/07 09:15  Note: 1. No water observered at drilling, cave 11.5' bgs after drilling 2. Dry and cave in at 11.5' bgs on 3/9/				-			S6SS	12.0		
		water observered at drilling, cave in a bgs after drilling	<u></u>	e gravel	yellow, dry, dense, fine grained, trace of fin Bottom of Boring at 15.0 ft below ground su				15.0	32.5_ - - - - - - 20
25										
30			$\dashv$							30